THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. CX. No. 2451.] LONDON, MAY 3, 1910. [62ND YEAR. PRICE 6d.

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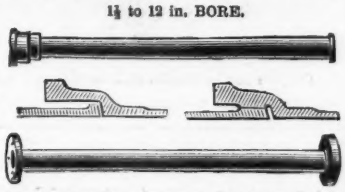

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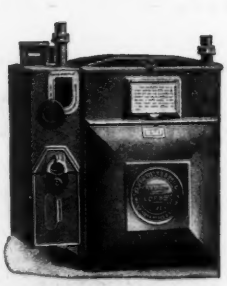

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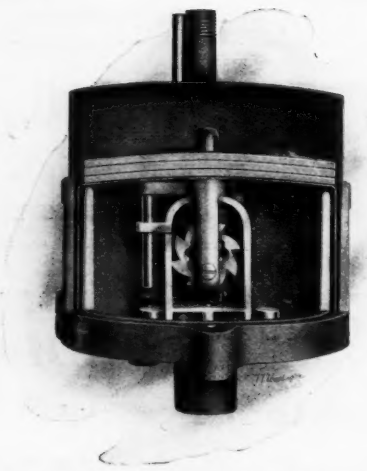

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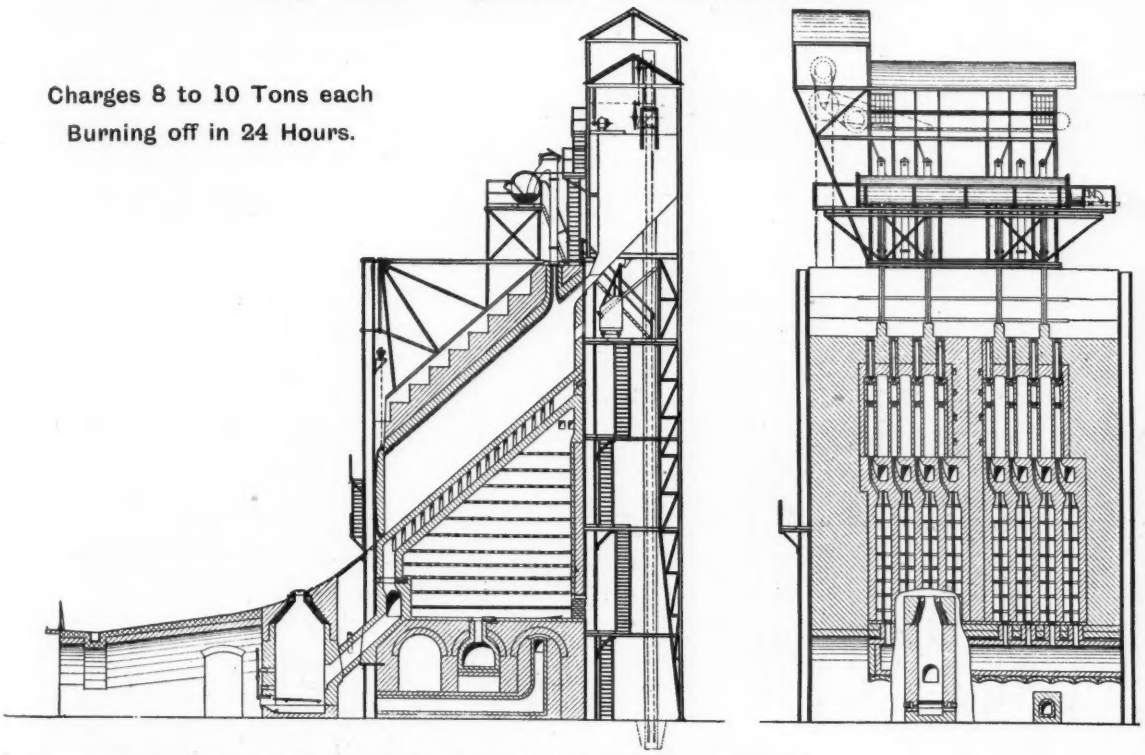

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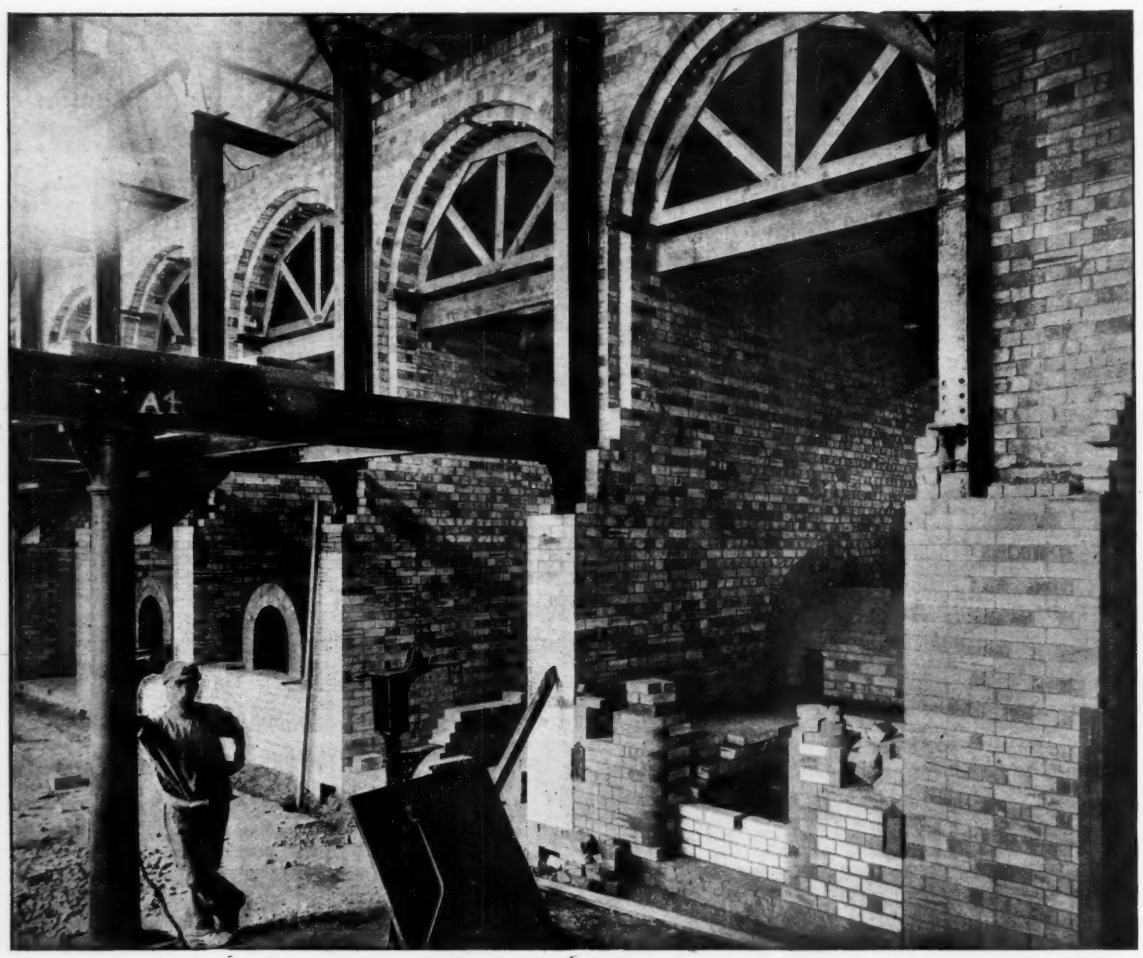

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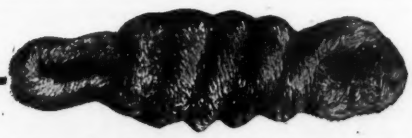

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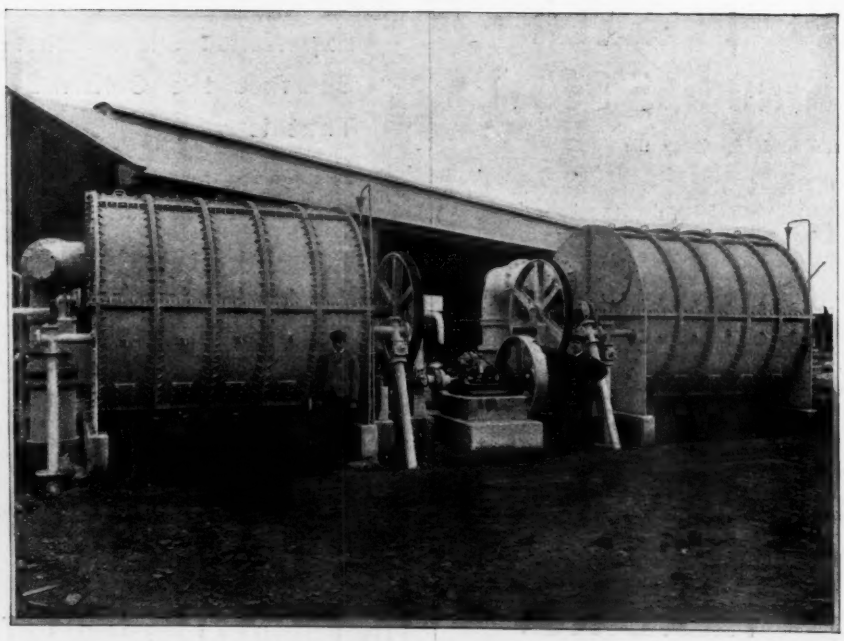

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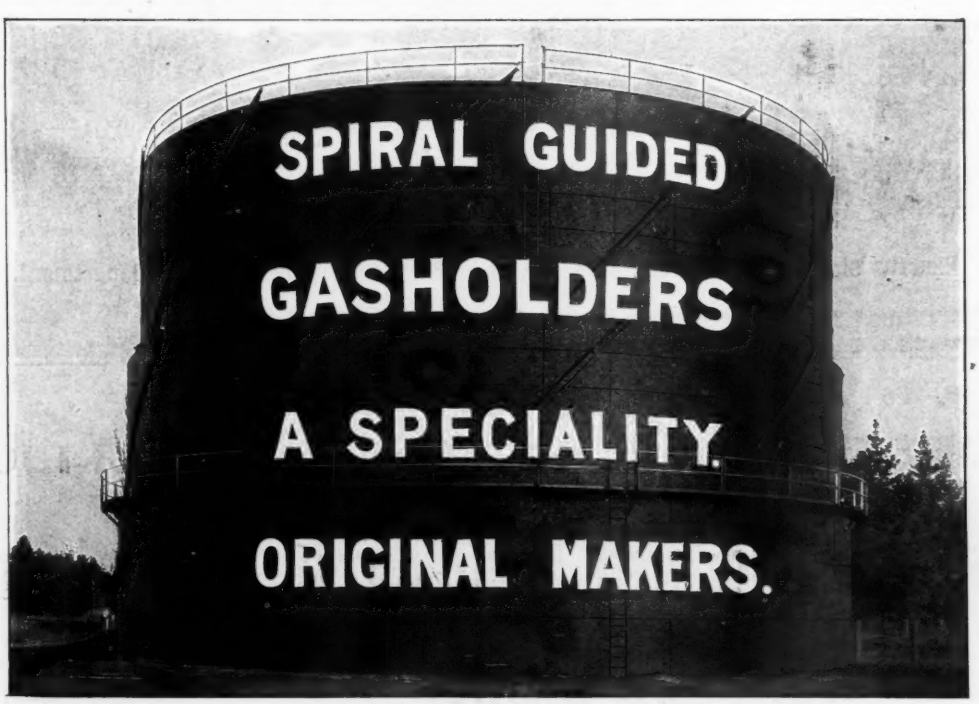

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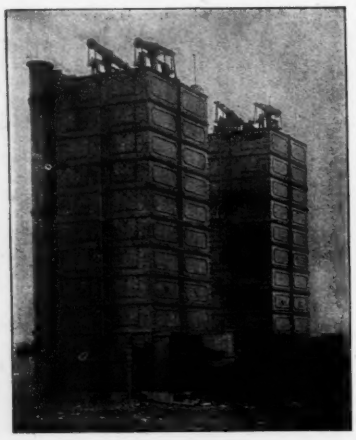

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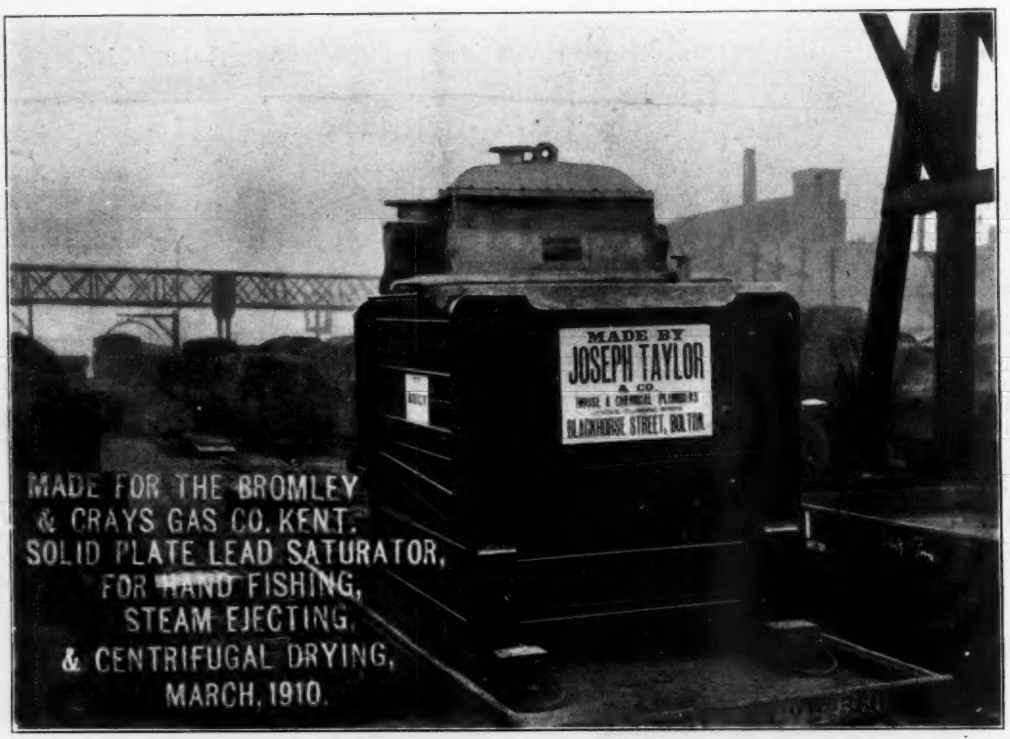

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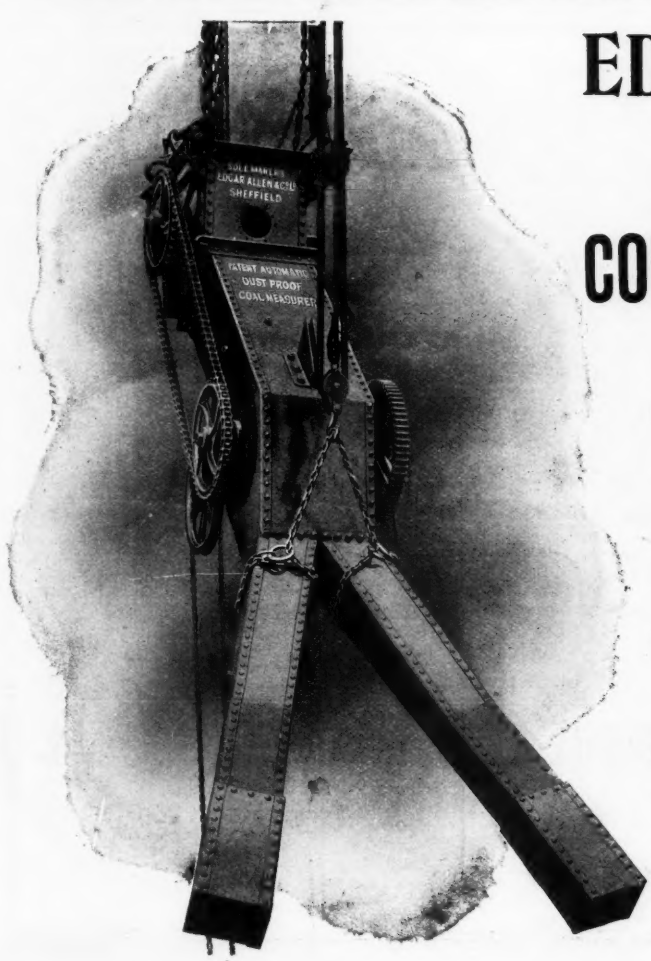

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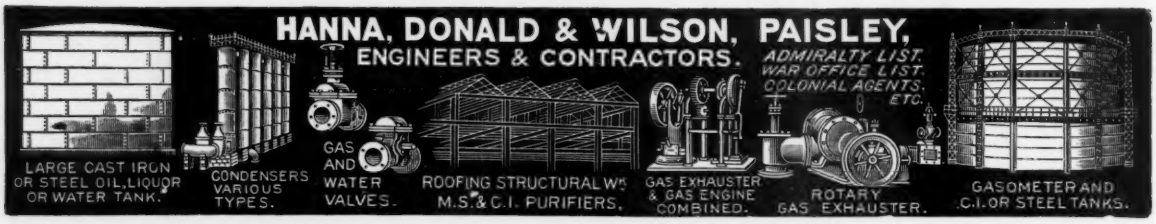
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EDITORIAL NOTES—GAS, &c.

Gas Undertakings and Electricity Deficits.

In last week's issue, an epitome of a lecture by Mr. Balfour Browne, K.C., appeared, with some editorial comments, dealing with the evils of State and municipal trading, and urging that the time had arrived when the position of the development should be thoroughly examined, and the brake and remedial measures be applied. In the same issue, in the ordinary news columns, there were reports, referring to Dublin, Londonderry, and Radcliffe, which presented three different phases of the question as applying to municipal traffic in electricity—showing, in the first place, how adventure of the kind can be egregiously harmful to the ratepayers, and, in the second place, where the law is at fault in not applying adequate limitations and regulations. The point of most importance raised by these reports indicates, with extraordinary emphasis, a defect of the law relating to municipal trading, in that there is no definite prescription of the extent either in amount or period to which or during which deficits incurred through trading may be charged upon the general rates before the price of the commodity is raised. With an undertaking in private hands, the ratepayers would not, if revenue did not counterbalance expenditure, suffer one iota. The shareholders would be the first to suffer; afterwards the consumers would be called upon to pay a price sufficient to meet the cost of the service rendered them, and to return a fair profit on the capital invested in providing the service. But in the case of a municipal undertaking—an electricity undertaking, for example—this does not happen. Those who have advanced loans representing the capital receive their interest whether or not the undertaking pays; and quite right, too, for they have no voice in, or power of, selection in the matter of those to whom the management of the concern is confided. Municipal administrations, too, have a peculiar propensity for diversifying their policy in respect of prices according to the undertaking concerned. Assuming that they have under their direction both gas and electricity undertakings, there is rarely any hesitation on their part to raise the price of gas if the amount desired in relief of the rates is in any way threatened; and likewise there is rarely hesitation on their part in declining to raise the prices—the extraordinarily varying prices—of electricity in the event of there being a deficit. The latter condition also applies where the electricity undertaking is, and the gas undertaking is not, under the control of the local authority.

The result is that in certain cities and towns some very heavy losses have been inflicted upon the ratepayers, owing to the recurring deficits on electricity undertakings, and the disinclination to increase the prices charged. These direct charges upon the ratepayers are not the only ones, as, in many instances, they are called upon to pay prices for public electric lighting that are much above those that would have to be paid for an equally efficient, and indeed a more efficient, gas service. It is, however, the direct charge upon the ratepayers with which we are concerned, and the infliction of which, with the open powers granted, can proceed to infinity. It is an infamous and a much-abused liberty. In the case of Dublin, no less than £64,000 has been taken from the ratepayers to finance the electricity undertaking—£14,000 in the past two years, and prior to that £50,000. At Hastings (to give only one other example) the net deficiency on the electricity undertaking to March last year was £11,043. This has been charged on the rates; and a further £2000 has been included in the current rate to meet last year's anticipated deficit. There is no justification for this. It is neither morally nor commercially correct; and, in allowing it to continue, there is an absolute dereliction of duty by local authorities. Through it the whole of the ratepayers suffer; and particularly such large ratepayers as gas undertakings. But where is it to end? There seems to be no effective means of stopping it.

The ratepayers of Dublin—and small wonder, being out of pocket to the tune of some £64,000—are much exercised over the question at the present time. An inquiry has been raised as to whether the Corporation are acting legally in what they are doing; and whether there is any way to put an end to their action in plundering the ratepayers generally, in the interests of electricity consumers. We are afraid there is not; for it is not illegal to do a thing in regard to which the law has provided no check. However, as will have been seen from the report published last week (p. 260), Mr. J. Picton Bradshaw questions the legality of the action of the Corporation in this matter. We wish that we could believe in the correctness of his submission. There may have been a dereliction of duty, and an abuse of privilege, in not charging higher prices within the maximum allowed; but we fail to find—subject to the view of higher authorities—anything that makes it compulsory upon the Corporation to charge the higher prices. The fact that there is provision for the application of surpluses above 5 per cent. on the capital to a reduction of price does not, we think, in any way prohibit the Corporation making reductions before such a surplus is reached; nor do we think such a provision can be interpreted to mean that up to the maximum price must be charged in order to try to arrive at such a surplus before a reduction in price may be made. It is conceivable that in cases a price below the maximum might produce such a surplus quicker than the maximum itself. But the prices charged in Dublin are much lower than the maximum, and heavy deficits are the result, the burden of which the ratepayers have to bear. This is not equitable, nor is it honest. The powers under which the Dublin Corporation conduct their electricity undertaking are much the same as those under which other authorities work; and in order to get what the ratepayers of Dublin now desire, the amended Bermondsey clause known as the Northumberland clause has, in a few instances, been applied. If the contention of Mr. Bradshaw was correct, there would, we imagine, have been no necessity for the Bermondsey, or its successor the Northumberland, clause. However, the power of unlimited extraction from the ratepayers of the wherewithal to make good deficits shows one of the several serious defects in the law regulating municipal trading.

Gas undertakings are interested in this matter both as ratepayers and as competitors. A curious revelation as to the tactics of municipal purveyors of electricity was made in the information regarding Londonderry, as published last week. It appears that, at a Local Government Board inquiry recently, the Corporation Electrical Engineer admitted that electricity was being supplied to private consumers at below cost price, and the deficit was debited to public lighting. There has been a protest against this on the part of the Gas Company, through their Manager and Secretary; and they have submitted a scheme showing how, by the adoption of incandescent gas lighting, a saving of some hundreds of pounds a year could be effected for the ratepayers. The revelation at Londonderry exposes yet another defect in the law that controls municipal electricity supplies.

The Radcliffe matter points out a still further direction in which a gas company carrying on business in a district where there is a municipal electricity supply, may be subjected to grossly unfair competition, as well as be called upon to bear a heavy contribution towards making good the loss incurred by the municipal electricity concern as an effect of the competition. The gas undertaking, in such an event, would stand in a worse position than any other ratepayer, and would be grievously wronged. Radcliffe is an illustration of what may happen. The District Council are the electricity purveyors in the town; the Radcliffe and Pilkington Gas Company are the gas suppliers. And now the Lancashire Electric Power Company are applying for a

Provisional Order to authorize them to supply current in the same area beyond a quantitative minimum per consumer. If the power is allowed, it must inevitably result in price-cutting between the two electricity concerns; and this, in turn, would compel the gas undertaking to protect themselves by adopting the same line of resistance, against both municipal undertaking and Power Company. Moreover, the triangular duel between the concerns would most assuredly result in deficits on the municipal concern; and there again the Gas Company would be badly hit. Competition between one lighting, heating, and power agent and another, cannot be said to be an undesirable thing, so long as it is conducted on terms of equality; but competition such as that proposed at Radcliffe is very undesirable. In competition, a gas company would far sooner meet an electricity company; for the two reasons that the rivalry would be on common ground, and that if, in the competition, losses resulted from the electrical trading, they would not in any part fall upon the ratepayers. What will happen here as the result of the Power Company's application can only as yet be a matter of conjecture; but we should imagine that, in considering the interests of Radcliffe, the Board of Trade will come to the conclusion that cut-prices would be no compensation for inflicting injury upon the general body of ratepayers, and for rendering unprofitable, or less potent and profitable, the electricity and gas undertakings, whose operations are much confined compared with those of the Power Company. We think that there is subject-matter in this article which deserves not only serious reflection, but action on the part of those engaged in the making of the laws controlling municipal electricity undertakings.

Eastern Counties Meeting at Great Yarmouth—Purification and Free Maintenance.

Great Yarmouth bestowed generous greeting and hospitality upon the members of the Eastern Counties Gas Managers' Association on the occasion of their spring meeting last Friday and Saturday. The Great Yarmouth Gas Company, represented by its venerable and learned Chairman (Sir R. H. Inglis Palgrave, F.R.S.), the Gorleston and Southtown Gas Company, and the Great Yarmouth Water-Works Company (of which Sir Inglis is also Chairman), together with his Worship the Mayor (Mr. Councillor T. W. Swindell) and some other of the town's dignitaries, did their utmost in uniting to make the visit a memorable one. But all this good spirit had but one actuating source, and that source was the energetic and much esteemed Engineer and Manager of the Yarmouth Gas Company (Mr. W. J. Carpenter), whose efforts were heartily seconded by the Manager of the Water-Works Company (Mr. Joseph Hawksley), and the Manager of the Gorleston Gas Company (Mr. J. Witten). The weather was kind to the visitors, and to those who had made themselves responsible for their entertainment amid the beauties of the popular seaside resort, and of its environment. The visit and the hosts, and the abounding goodwill, will long remain among cherished memories. But these are of the social side of the gathering, the story of which will be found in the report elsewhere.

The time set apart at the meeting for technical work was absorbed by the discussion of two very practical current questions—one referring to purification on most approved and economical lines, the other to that much considered development in commercial activity, free supervision or free maintenance of incandescent gas-burners. Both subjects were introduced to the members in, by request, short papers; and these proved as big a success in provoking discussion as the most seriously exhaustive production might have been. In fact, the members did not feel surfeited with the subjects—as is sometimes the case with laboured disquisitions—before they were invited by the President (Mr. John Young) to discuss them. The paper on purification was by Mr. Frank Prentice, and that on free maintenance by Mr. F. L. Wimhurst. The interest of the paper by Mr. Prentice centred entirely in, and the subscribed testimony attested the effectiveness of, the backward rotation system of dealing with purifiers for the elimination of sulphuretted hydrogen, from the points of view of their duration, the increased absorbing capacity of the material, and cost. When in his comparatively limited circumstances, Mr. R. G. Shadbolt is able to point to the system having reduced his labour costs for purification to 0·08d. per 1000 cubic feet, there is evidence of economy for all in the system, and such economy as purification in closed vessels by liquids will find it hard to beat. The notes by Mr. Prentice supplied the evidence, working under this system, as to longevity, and the large sulphur absorption of the material before being discarded; and what he described as the "mystery" of this success, received not a positive, but a very feasible, explanation at the hands of Mr. Thomas Glover. It is that in this system the box containing the clean material is placed first, and not last; and as oxide of iron cannot absorb sulphuretted hydrogen and oxygen at the same time, the latter passes through the clean boxes which are absorbing sulphuretted hydrogen, and on to the foul boxes, which are revivified by it. In this way, the oxygen is preparing the last boxes for being put first in rotation. Whether or not this is the true explanation, has yet to be confirmed; but Mr. Glover puts it forward as a solution of what has been inexplicable, and for those interested to submit to further proof. The discussion produced several hints from personal experience—among others a simple method adopted by Mr. Glover for rendering his purifier-boxes when being emptied free from nuisance to the neighbourhood, and innocuous to his men.

Mr. Wimhurst is to be congratulated upon his maiden effort on a subject that is of pressing importance in connection with the lighting business. The incandescent gas-light for interior illumination is much cheaper than the electric light in its most modern form. But we have to recognize one disadvantage in comparison with electric lighting; and it is that incandescent burners do entail periodical attention to maintain their high lighting efficiency. The question is, how is this disadvantage to be neutralized or minimized? It can only be adequately done by activity on the part of gas suppliers themselves; and this brings us to the point of free maintenance or free supervision. The question was raised in the discussion, Can we afford to do it? We think that the interposition of a negative in the question would have more effect in throwing light upon the situation—Can we afford not to do it? From this standpoint it should be mainly considered. There are many sides from which the subject must be regarded, as was shown by the discussion; and an examination of these may be deferred for a week. Meanwhile, it will be seen, from Mr. Shadbolt's remarks in the discussion, that the question of the formation of a Committee by the Commercial Sections of the District Associations for the purpose of considering the matter of co-operative advertising has been taken in hand; and this, too, is a subject which will bear further reference next week.

The Economy of Small Lighting Units.

Unceasingly in the gas industry, we are talking of economies achieved and in prospect from the point of view of the gas supplier, in which economies the consumers participate through the reductions thereby made possible in the price of gas. How is the consumer made to realize that he is deriving benefit from these reductions? It may be that in the very quarter succeeding the lowering of the charge, the consumer may have unconsciously been using small additional quantities of gas that, in the aggregate, wipe out entirely all trace of the benefit the reduction has brought to him. But while there is so much talk of, and attention paid to, manufacturing and capital economies, in which consumers and suppliers share, there does not seem to be a great deal of work going forward with the specific intention of showing consumers how they themselves, within their own houses, may produce considerable economies by applying the developments of more recent times in place of the older form of gas-fittings. In the show-room attached to the gas distribution department, there may be displayed all the most economy-producing appliances of the day, and yet a large proportion of the consumers may be totally ignorant of their existence, or of the value from a pocket point of view of their adoption. They must be brought before the consumers, and their virtues extolled, in a more direct manner. In the electricity industry, the boast prevails (though there is no foundation for it in fact) that, for domestic use, there is a range of metallic filament electric lamps—unequalled by incandescent gas-burners—suitable for all positions and purposes, and, by a discriminating application of these lighting units to requirement, considerable economy of current can be obtained. There is truth in the statement as to economy being derivable by utilizing lamps sufficient for the (shall we so express it?) maximum requirement of position; but there is no truth in the statement that

the gas industry has not a range of incandescent burners suitable—and, being suitable, economy-producing—for any position. The superstition in this respect is, we fear, due to the apathy in educating gas consumers, by some direct means, in the choice and application of burners appropriate to condition.

The electrical canvasser may go into a gas consumers' house; and the chances are that he will find throughout the house—in ordinary rooms, in the bedrooms, in the hall, on landings, in lavatories, bath-room, &c.—"C" burners, using (say) 3½ cubic feet each per hour, or a large form of inverted burner, representing in their uniformity an unnecessary waste of gas. No wonder that in such a house an electrical canvasser, by cutting down his lighting units to a point that, in his imagination, will be suitable for the purpose, is able to give the householder an estimate (the word should be underlined) as to annual cost of lighting that in some cases, in comparison with the gas bill for lighting only, is not altogether unattractive. That this is so, is due entirely to the insufficient use that is made of the types of gas-burners that, while being small in consumption, are very efficient. In the inverted line, there is the bijou burner—excellent for drawing-rooms, bedrooms, landings, &c., and there are the medium-sized inverted burners that are particularly appropriate for dining-rooms, halls, &c. As a matter of fact, for purely domestic purposes (not for many others that could be named), the large size inverted burner appears to be at a disadvantage in point of size, adjustment to requirement, and in other respects. Then in regard to upright burners, we were only last week noticing a series, including one with a consumption as low as 1¼ cubic feet an hour, and a high efficiency, while another may be expected shortly that will only consume between ½ and ¾ cubic foot of gas, and give a light of about 17 candles. In the adoption of the lower units of light where applicable, the gas consumer can realize economy, together with other advantages. In their use in rooms (besides the greater decorative effect than can be obtained by employing larger units with their big globes), the division of the heated upward current has, in our experience, a remarkable effect in maintaining ceilings in a cleanly condition; and, in addition, the smaller units enable the illumination to be regulated just as desired—from that afforded by one burner up to the maximum possible illumination of the complete installation in a room. Further a house after dusk always look brighter, and gives the inmates a greater sense of comfort, by having a light in almost every room. With the small incandescent burner units, this condition can be satisfied in an inexpensive way.

From all points of view, the advice may be taken to be sound: Pay more attention to the small lighting units, and explain to the consumer that they offer him economy and convenience that will, in a short time, repay their installation in suitable positions.

Gas Examination Questions.

In last week's "Journal," there were published the questions set by the Examiners—Mr. Thomas Glover and Mr. J. H. Brearley respectively—in the "Gas Engineering" and "Gas Supply" sections of the Technological Examinations of the City and Guilds of London Institute. When a new examiner comes forward, there is a disposition on the part of those who have been through the mill to put the character of the questions under scrutiny in a somewhat critical fashion, in order to "size up" the examiner compared with his predecessors; and there is also a certain amount of anxiety on the part of prospective candidates to see whether there is the likelihood of a tough job, or of a chance of being let off lightly. We think it will be generally conceded that Mr. Glover has judiciously taken a middle course in inditing the questions for both the honours and the ordinary grades. It is not just to candidates, without the large experience of their professional seniors, to put to them questions that are extraneous to what may fairly be considered daily practice, or do not fall within the scope of ordinary study and reading. Both examiners have had a conscientious regard for this view. In the "Gas Engineering" examinations (honours and ordinary), real engineering questions—that is to say, questions affecting structural work—do not by any means take a prominent place; but, in major part, the questions set may be described as referring to technical management, and otherwise are largely physical and chemical in character.

The questions having relation to technical management are quite up-to-date. In the honours grade, for example, there are the inquiries as to vertical retorts, the knowledge needed to answer which ought to be the possession of every student who takes an intelligent interest in the course of the industry's technical development. There is also the one as to the details of the design of, with the method of governing, a gas-engine intended to overcome fluctuations in voltage where the engine is used for generating electric current. That is a question which properly points out to gas-engineering students that in these times their education is not complete without technical electrical knowledge. It is also a question which both examiners might claim as coming within their particular spheres; inasmuch as the gas-engine driven electricity generating plant is a common feature of gas-works to-day, and such a generating set will give the large electricity consumer on the district what he requires at a cheaper rate—taking lighting and power together—than that at which the ordinary suppliers of electrical energy can supply him. In the ordinary grade, there is one of those questions on a simple detail of a gas-works plant that might floor many a gas engineer. "Sketch," says the examiner, "the front and side elevation of a self-" sealing retort mouthpiece." It is quite a proper request; but how many gas engineers to-day pay strict attention to the details of self-sealing retort mouthpieces? There are several excellent self-sealing mouthpieces on the market; and engineers know them to be so, and have probably never had any fault to find with those on which they have bestowed their preference. The consequence is that the usually favoured are specified for new or reconstruction work, or orders are sent direct for them; and there is an end of the matter. Nevertheless, unless an engineer can sketch a front and side elevation of a self-sealing retort-lid, and knows its details thoroughly, he can hardly be said to be a competent judge of what constitute the good points of the article.

In the "Gas Supply" honours and ordinary grades, Mr. Brearley covers a vast amount of ground; and yet how much more on the technical side of the distribution department of a gas undertaking remains to be covered! The questions are very practical ones; and no one aspiring to position in the commercial-technical operations outside the gates of the gas-works can afford nowadays to be ignorant of any of these matters. The questions that have been set on this and previous occasions bring home the extraordinary changes that have been wrought in the gas-supply department not only through competition, but by the extended applications of gas and the new means of more efficiently producing the original purpose of gas combustion—illumination. These examinations should be helpful in raising the status of those engaged in the distribution department, and in producing a better recognition of the truism that the labourer is worthy of his just hire.

Metamorphosis of Coalite Bye-Products.

The heavy fall in the quotations of the shares of the British Coalite Company which occurred recently is doubtless responsible for the issue to the shareholders of a circular-letter, signed by the Chairman of the Board of the Company, giving some particulars as to the "commercial work-" ing of the process." This letter, which is reproduced on another page of to-day's "Journal," discloses the fact that the Company have gone to yet another expert for advice as to the utilization of the tar which is an abundant bye-product of the coalite process. In 1908, we learnt from the specious advertisements and articles intended to boom the coalite business that a ton of coal distilled in the coalite "retorts" yielded about 23 gallons of tar, from which were obtained a series of products of extraordinary virtue and value. Among the products named were (per ton of coal) about a gallon of the "finest motor spirit in existence," a gallon of light oils or "solvent naphthas," a quantity of tar acids, seven gallons of "fuel oils," and a quantity (as nearly as we can calculate from the figures given, about 1 cwt.) of pitch or bitumen. The motor spirit was to emancipate the country from the foreign control of its supplies of that commodity; while the fuel oils were to ensure "immunity from "any humiliating dependence of this nation in time of war "upon the oil-wells of America or elsewhere." How does this glowing description of the products of coalite tar and their importance to the country tally with the latest information as to what is actually being done with the tar? We learn from the circular, dated the 20th ult., that the coalite tar produced from one ton of coal has, in practice, been proved to contain: 4·75 gallons of naphtha solvents, 4·07

gallons of tar acids, 3·10 gallons of disinfectant oils, and 98 lbs. of pitch or coalite bitumen.

What has become of the motor spirit and the fuel oils, with which coalite was to menace seriously the markets of "the rings and trusts which control the supply to this "country of motor-spirit and burning oils." These rings and trusts were represented as already in 1908 resenting the intrusion of coalite, "with its potentialities of rendering "us absolutely independent of the Standard or any other "foreign oil company, as far as the supply of oil for fuel or "for internal combustion engines is concerned." Have the rings and trusts triumphed, that eighteen months later, in a period of phenomenal booming of oil-producing undertakings, motor spirit and fuel oil are no longer named as products of the marvellous coalite tar? We trust that the British Coalite Company have not been persuaded to come to an understanding with the rings and trusts to suppress its production of the spirit which was superior to petrol, and of the fuel oil which was to become the "sinews of war" for the British Navy. Can it be that the Company have received a valuable consideration from the rings and trusts, that it has thus within eighteen months become so unmindful of the best interests of the British people? If so, is it fair that it should continue to style itself the "British" Coalite Company? It cannot, of course, be that the motor spirit and fuel oils which coalite tar was stated to yield in such enormous quantities and of such superlative quality are not actually forthcoming from it! If statements concerning them were indeed flights of the imagination, what credence will the guileless shareholder in the British Coalite Company place in the statements—intended to reassure him—made in the present circular? May he not confidently anticipate that, after a further short lapse of time, a fresh tar-expert will have been called in to advise the Board, and that it will be found that "in practice" the tar no longer contains some of the most valuable products now obtainable from it? If we exclude for the nonce the interference of the machinations of the rings and trusts, another violent metamorphosis of coalite tar may be confidently anticipated at the time when quotations of the Company's shares again exhibit a startling depression in their market value.

Electrical Disaffection.

The electrical people have been trying to move heaven and earth to get set aside the street-lighting contract that the Westminster City Council have thought fit and proper to enter into with the Gaslight and Coke Company, and to have revised prices for electricity submitted. But they are too late. The Gaslight and Coke Company fully understood the explicit contract conditions of the City Council; but it appears that the St. James and Pall Mall Electric Supply Company did not, or rather they insinuate that they did not. Something might well be said here about the variation in the degrees of intelligence of those who interpret the conditions of contracts for respectively the Gas Company and the Electricity Company; but we will forbear. The St. James and Pall Mall Company, however, are very sore over the whole business; and we rather think, having regard to the prices they submitted, that the losing of a piece of street lighting in the very heart of the West-end ranks second in their annoyance to the tormenting criticism to which they have been subjected from all parts of the electrical ranks for allowing the Gaslight and Coke Company to have such a triumphant win, which includes not only the choice area electrically lighted at present and up to November next, but all the streets within the jurisdiction of the Westminster City Council at present lighted by gas, about which further particulars are given elsewhere. The Electric Supply Company, in their distraction, sent a circular to the members of the City Council, which Mr. Jacques Abady, the Chairman of the Works Committee of the Council, described at the meeting of the latter on Thursday, as being full of misstatements, and a contravention of a standing order which prohibits contractors or tradesmen canvassing members or officers of the Council in support of their tenders. The Company plead to be allowed to revise their prices. But it is too late. If they were allowed to do so, the prices of the Gas Company are so considerably below theirs that the revision would have to be on a heavy scale; and, if, again, they were permitted to do so, then in fairness the Gas Company would be entitled to a similar right—their figures having been disclosed. Where, then, would such an abuse of tendering end? The contract, however, is safely in the hands of the Gas Company; so that the Electricity Company's endeavour to upset a settled condition of things has been as ineffectual as it was foolish. Hinging upon this matter, the "Electrician," in a comment upon the success of the Gas Company in their issue of April 22, referred to Mr. Abady, the Chairman of the Works Committee, as being an out-and-out supporter of gas, and alluded to his views as being "somewhat biassed." There was a nasty flavour about the words; and underlying them there seemed to be an insinuation of prejudice having begotten preferential treatment. In the current issue, it is interesting to find our contemporary confessing to having taken a mistaken view of Mr. Abady's attitude in the conduct of his voluntary public duties. What was the actual cause of that change of view?

Illuminating Power at Sheffield.

As will be seen from particulars which appear in another column, the Board of Trade have issued the Provisional Order applied for by the Sheffield United Gaslight Company. The main objects for which the Order was sought were to provide for a reduction in the illuminating power of the gas and the adoption for testing of the "Metropolitan" No. 2 burner. The application was the subject of an inquiry some two months ago at the offices of the Board of Trade, when it was explained that the Company's first object was to bring the illuminating power of their gas and the testing of it up to modern conditions—that was to say, they wished to be able to supply 14-candle instead of 16½-candle gas, and to use the new burner for testing it. On behalf of the Corporation, it was urged that the Company were asking too much, when so many other companies were at present merely applying to Parliament to use the new burner; and it was suggested that the Order should go forward simply providing for the alteration of the burner. Mr. Hanbury Thomas gave evidence for the Company, as did also Mr. Charles Carpenter, Mr. H. E. Jones, and Mr. J. F. Bell, of Derby (who stated that their experience of 14-candle power gas in a place similar to Sheffield was a large increase in consumers and no complaints). Mr. Hanbury Thomas pointed out that it was not desired to go down to 14 candles at once. All they proposed to do was to leave off enrichment; and this would probably make only 1-candle power difference, as they used a very good class of coal. For the Corporation, Mr. William Newbigging gave evidence to the effect that the two things asked for would affect the consumers adversely. The Order as issued provides for the supply of 15-candle gas, to be tested by the "Metropolitan" No. 2 burner. Arrangements are to be made for supplying, within a period of two years, suitable flat-flame burners for the gas to consumers who may desire them; and there are also sections dealing with the offering of debentures for sale by public auction or tender, and the holding of the meetings of the Company annually, instead of half yearly, as is necessary at the present time.

Twelve-Candle Power.

Local authorities owning gas-works are now leading in the matter of the reduction of the standard of illuminating power of gas. This fact stands in strange contrast with the violent antagonism shown by local authorities who do not own gas-works when gas companies go to the length of asking for modest reductions of their standards. Only last session, the Bury Corporation had the standard of illuminating power prescribed in their Act at 12 candles, as tested by the "Metropolitan" No. 2 burner; and now this session the Local Legislation Committee of the House of Commons have agreed to the Corporation of Middlesbrough reverting to the standard of 12 candles under which they worked up to 1898. In the Corporation Act of that year, it was raised to 15 candles; and now it is going back again—Mr. David Terrace, the Gas Engineer, having advised, and satisfied, the Corporation that with the incandescent burner, and the large use of gas for other purposes in which the illuminating power is of no account, a standard of 15 candles is no longer necessary. These instances of legislative accord with the requests of local authorities to a reduction of standard below 14 candles will supply another point for the already strong case of the gas companies, and perhaps help to induce Parliament to take a still more lenient view of the submission that a standard of illuminating power is about ripe for relegation to the abode of those things the useful existence of which has come to an end.

Metropolitan Borough Councils and the Westminster Street Lighting Contract.

The electrical interests are evidently at work trying, by an indirect method, to make the Gaslight and Coke Company suffer for the bold stroke they successfully made to win the Westminster public lighting contract. A paragraph, under "Electrical Notes" in "The Times" Engineering Supplement last Wednesday, dealing with the question of public lighting, contained the following: "It is clear that an heroic effort is to be made by the gas companies to crush electrical competition in this field. Unless there has been some serious error in the figures, it would appear that the Westminster City Council are to be allowed to renew their contract with the Gas Company at amazingly cheap prices—far lower than those charged by the same Company in other parts of London. Already it is understood that several local authorities are conferring with the intention of enforcing the legal provision against preferential treatment—that is to say, if Westminster is to be lighted at rates which represent a charge of only 5d. or 6d. per 1000 cubic feet of gas, other borough councils will insist on the same terms. If the Gas Company foresaw this development, the only inference is that a determined effort is being made to overwhelm electric competition in street lighting throughout a large part of the London area." It is evident the writer of the foregoing is quite ignorant of the great advance that has been made in the lighting efficiency of high-pressure gas-lamps, and therefore of how the contrast figures work out.

Local Government Board Procedure.

At times, one notices in the popular newspaper Press that profitless discussions take place in the correspondence columns, and apparently excite the greatest interest among readers—particularly if they happen to deal (as, indeed, is usually the case) with what may be termed a "social problem." This being so, it should not be too much to hope for free ventilation of views on a practical question of considerable moment, when attention is drawn to it by a correspondent in the pages of a technical paper. In another part of this issue, an Engineering Firm allude to a matter which it will be agreed is of far-reaching importance to a large number of municipal authorities, as purchasers of engineering materials, on the one hand, and to trading concerns, as manufacturers of such materials, on the other; and it is a hope they express that what they have to say may call forth some interesting and useful comments from readers, which has led to the opening lines of this paragraph being written. As the question broached deals with nothing less than an alteration in the procedure of a Government Department, the necessity for enlisting the aid of as large a body of public opinion as possible (if anything useful is to be accomplished) will be generally admitted. Briefly, the point is the Local Government Board's power of veto over the use of certain materials by municipal engineers. That there should be some measure of control and advisory power, is agreed; but the question raised is whether, in order to secure the maximum of impartiality and efficiency, this important power should be in the hands of a single official, who, it is urged, "may not be in complete touch with all the modern improvements in plant, or who may hold views not in line with those entertained by other engineers of experience or by the profession generally." What is suggested by our correspondents is that such questions as the permissibility of certain materials and the loan periods to be assigned to works should be referred to a committee consisting of gentlemen of knowledge and experience, and including some representatives of the public spending departments who have to do with engineering. Even beyond this, a higher court is proposed for important cases, in the shape of a still larger committee composed of eminent engineers—say, the Presidents (or elected members) of various big societies. Point is certainly given to the criticisms by our correspondents of existing methods by their recital of the fact that some of the materials which are vetoed, or penalized, by the Local Government Board are in extensive use by the other public departments. Such a progressive science as engineering, it goes without saying, needs continual revision of ideas.

The April issue of the "Journal and Transactions" of the Society of Engineers (Incorporated), which is edited by the Secretary (Mr. A. S. E. Ackermann), contains a paper on the Moulmein Water-Works, which was read by Mr. Percy G. Scott at the meeting on the 4th ult. There is also a report of the discussion

THE STATUE OF SIR GEORGE LIVESEY.

In the Exhibition of the Royal Academy at Burlington House, which opened yesterday, will be found the statue of Sir George Livesey, which has been executed by the well-known sculptor, Mr. F. W. Pomeroy, A.R.A., for the South Metropolitan Gas Company. It will be remembered that the Chairman of the Company (Mr. Charles Carpenter) some time since announced that the Directors had consented to the exhibition of the statue at the Academy, in view of the fact that it would enable a large number of the friends of the late Sir George to inspect the work by Mr. Pomeroy. Afterwards the statue will be erected in the garden at the entrance to the Company's offices, in the Old Kent Road.

We are sure that a large number of gentlemen interested in the gas industry will take advantage of this opportunity of seeing the statue, and that, as the result, they will agree that Mr. Pomeroy has faithfully caught Sir George's pose and features. The statue depicts Sir George holding his hat in the right hand with the left hand on hip—evidently (as was his wont) carefully considering some matter of serious import. The face is alert; and, in the opinion of several members of the Royal Academy who knew Sir George, it is a most excellent portrayal. The statue is 8 feet high, and is cast in the best statuary bronze. The pedestal on which it is to stand will be wrought in the best Aberdeen grey granite (6 feet high), with an appropriate inscription. The whole work—bronze casting and pedestal—has been executed by British labour.

We heartily congratulate, as we are sure many others will do, Mr. Pomeroy on the result of his labours, and the general satisfaction that it will give in the gas industry.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 333.)

LAST week was account week on the Stock Exchange; and a feeling of some uneasiness and apprehension in regard to its adjustment in the fashionable speculative markets imparted a degree of dulness which extended to other departments and militated against activity. Throughout the week things swayed this way and that, now better now worse; but they were well above their lowest at the close. The opening day was not cheerful. The leading markets inclined to give way, the American and South African were weak, and even Rubber and Oil were chastened into sobriety. Tuesday was another quiet and rather depressed day for pretty well every department. But gilt-edged lines were strong, and Consols rose $\frac{1}{8}$. Wednesday came out somewhat brighter. Consols advanced another $\frac{1}{8}$, the markets in general were firmer, and even Americans ceased to fall. On Thursday, clouds gathered again, and there was a marked movement to liquidate. Everything was rather weaker, except Home Government issues. Friday seemed agreeably surprised that the settlement had so far revealed no catastrophe, though, of course, it was not all over yet; and things, therefore, assumed a more cheerful tone even if markets could not be called strong. This state of affairs was maintained on Saturday, and the close was certainly less agitated. In the Money Market, there was a good demand for accommodation; but discount rates steadily eased in view of the improved gold position. Business in the Gas Market was much quieter. A comparatively small number of issues were dealt in at all; and they were devoid of any animation. Prices were as nearly as possible stagnant. In fact, setting aside the "*ex div.*" variations, there was only one change of quotation on the London Market and two on the Provincial Exchanges. In Gaslight and Coke issues, the ordinary was quieter, and not disposed to move. Stock changed hands at figures ranging from 103¼ to 104¼. In the secured issues, the maximum realized 89, the preference from 104⅞ to 105⅜, and the debenture from 81¾ to 82⅜. South Metropolitan was little dealt in, at about the old prices; transactions marking from 120¾ to 122. The debenture was done at 82 and 81¼ free. In Commercials, there was only one bargain in the 4 per cent. at 108. Among the Suburbans and Provincials, Alliance and Dublin was dealt in at 82½ and 83¼ (a fall of 1), Brentford old at 251½ and 253, ditto new at 188 to 189¼. On the local Exchanges, Newcastle was done at 105 (a rise of ½), and Chester advanced a point. The Continental companies were as quiet as the rest. Imperial had a few dealings at from 181¼ to 182¼, ditto debenture marked 94½, and European fully-paid 24⅜ and 24¾. Among the undertakings of the remoter world, Bombay changed hands at 6⅜, Hongkong at 17⅜ *ex div.*, Monte Video at 13$\frac{1}{16}$, Primitiva at 7$\frac{1}{16}$, ditto preference at 5⅜ and 5¼, ditto debenture at 99½, River Plate debenture at 99¾ and 100½, San Paulo at 15⅜ and 15⅝, and ditto debenture at 51½.

ELECTRICITY SUPPLY MEMORANDA.

Life of Metallic Filaments in Street Lamps—Other Public Lighting Points—Blackening and Fragility—Latest from Newmarket—Worn Quotation.

THE "Electrician" has been gleaning information regarding the use of metallic filament lamps for street illumination, on which subject there seems to be a great deal of anxiety at the present time. The main interest to be extracted from the efforts of our contemporary is in regard to the testimony as to the life of metallic filament lamps in public places, which testimony shows that there is a want of concord in the experiences. It is a little difficult to get at a figure that may be taken as approximately an average life, as, according to charts referring to Wimbledon, the failures commence quite early at 200 hours or under, and go on progressively till a few lamps are still existing at 3000 hours. At Hammersmith of 14 400-candle power Osram lamps fixed only on Nov. 1 last, the average life of half of them was 1360 hours; while the remaining seven were running at 2500 hours. These 400-candle power lamps are not inexpensive things. At Heston and Isleworth the average life of 80 100-candle power "Meta" lamps in the last twelve months was about 1700 hours. At Stepney, half-a-dozen 100-candle power Osram lamps have returned an average life of 1267 hours. From Nuneaton, it is reported that an average life of 2000 hours is being obtained with 50-candle power lamps. At Blackpool, Osram lamps are used, in units of 30, 50, and 100 candle power; and they enter upon their final rest with an average life of about 1000 hours, though in a number of cases the lamps have run as long as 2000 hours. In Horsham streets, free from the great turmoil and bustle of northward towns, the average life of tantalum lamps is about 1600 hours; but singularly the results noted with tungsten lamps are far from uniform. Several other engineers do not commit themselves to figures; among those who adopt a non-committal attitude being the engineer at Canterbury, who says that a few high candle-power Osram lamps have been installed there for street lighting, "and at present he has no fault to find with them." This suggests that the gentleman in question when writing was in an anticipatory mood, and that trouble was peeping over the horizon. But the figures that are given indicate that, if about 4000 represents the lighting hours in a year, then, generally speaking, round about three lamps will be required for renewals in the course of a year; and metallic filament lamps cost shillings apiece contrasted with two or three pence for mantles.

In several places high-power metallic filaments are replacing arc lamps; and in this connection it is estimated by the engineer at Nuneaton (in the report incidentally referred to above) that the cost of renewals will work out at about two to three times the cost of renewals with arc lamps; but a considerable saving—more than sufficient to compensate for renewals—it is thought, will be obtained in labour. From Pembroke (co. Dublin) is forwarded the intelligence that the cost of metallic lamp renewals is practically equal to the cost of carboning the arc lamps previously installed; but it has been found possible to dispense with the services of a lamp trimmer. The practice of adopting high-power metallic filament lamps in place of arc lamps has a disadvantage in that it tends to increase the risk of a standard being in darkness, for which reason it is thought preferable at Nuneaton to use a number of low candle-power units. Among other points it is seen that at Wimbledon, gas-lamps have been completely discarded, in order to give the electricity generating-station more work; and for 91 flame arc lamps, 44 300-candle power Osram lamps, and 1092 50-candle lamps, the annual cost runs out to something like £6500—capital charges and electricity amounting to £4700, and attendance, repairs, and renewals amounting to about £1800 per annum. From Gillingham, there is an interesting note. Mr. Chalmers reports that he has recently photometered about half-a-dozen of the incandescent gas-lamps in use for street lighting, for which the Gas Company claim 140-candle power; and he obtained an average of only 39·4-candle power—so that about 100-candle power has gone astray. It is added that a Harrison flicker photometer was used in making the tests. The missing candle power speaks badly for the photometer; but perhaps Mr. Haydn Harrison will say that, if photometry is conducted at Gillingham in anything like the fashion that Mr. H. Ross Hooper, of the Local Government Board, thinks that the electricity accounts there are kept (kept in such a manner that an inquiry for a loan has had to be adjourned *sine die*), then the observer not the photometer is unreliable. Of course, this is a matter for Mr. Chalmers and Mr. Harrison to settle between them.

Having before us all the good things—longevity and so forth—that can be said in electrical print in favour of metallic filament lamps, and with all the other things left unsaid, one turns with interest to a letter from the Foster Arc Lamp and Engineering Company touching upon the article, by Mr. G. B. Barham, on the blackening of the bulbs of metallic filament lamps, to which we made reference in the "Memoranda" on April 5. The writers complain that Mr. Barham does not leave us any nearer overcoming the difficulty, which he states, and with good reason, undoubtedly exists. In their opinion, there is not any exception, in all the different makes of lamps, to the liability to "blacken;" and when one takes into consideration the serious loss of efficiency caused by such "blackening," one is bound to come to the conclusion that the high-voltage lamp, as at present made, is by no means a success. As it cannot be thought that the Foster Company desire to do the electrical industry any harm, it may be taken that they are writing honestly when they say: "When the *heavy first cost* of installing a house with high-voltage lamps is taken into consideration, and also the *expense of renewals, owing to their great fragility*, it almost passes one's comprehension why contractors (who admittedly suffer severe loss in the stocking of these lamps alone) should recommend their clients to use them. It is now so well known that with the use of a transformer on alternating current, and low-voltage lamps, both the first cost of installations and the running costs afterwards, are so much cheaper than installing high-voltage lamps, that it scarcely needs comment, and low-voltage lamp 'blackening' has been reduced, on a good standard make of lamp, to a minimum." Having had under observation all makes of high-voltage lamps, the writers do not think that any method is at present in use which can safely be said to overcome the trouble in the manufacture of these high-voltage lamps which results in the "blackening" referred to. The Foster Lamp Company are located at Wimbledon. We cannot make their experiences and comments coincide with the report from Wimbledon on the use of metallic filament lamps in the streets. Such lamps installed in the streets are not any more exempt from "heavy first cost," "expense of renewal, owing to their great fragility," and blackening, than lamps used for interior lighting.

Mr. Frank A. Simpson is not only the Electrical Engineer of Newmarket, but he is an enthusiastic diver into ancient manuscripts, and a plagiarist who concocts letters largely composed of stock quotations that have for years done duty with poor success in the advertising literature of the electrical industry. We asked Mr. Simpson a fortnight since to favour us with answers to certain questions touching upon some declarations he had made as to the vitiation of the air of rooms by the combustion of gas (p. 164), as we had, and still have, grave doubts as to that gentleman's personal knowledge giving support to his dogmatism. But Mr. Simpson, for some reason or other which may be left to the selection of our readers, does not come up to the scratch, and give us that proof of his personal competence for which we asked. Looking back over the questions, we have some feeling that his refusal to offer replies is the best display of wisdom that he has yet shown in the controversy in which he has been taking part. Mr. Troughton has had his turn at the last letter penned by Mr. Simpson, to

which we referred on April 19; and now the latter gentleman has occupied the greater part of a column of the "Newmarket Journal" with a further letter largely composed of (electrically) well-thumbed quotations. He reproduces, as if to make a point, a statement by Dr. Rideal that one gas-burner consumes 4·2 cubic feet of air per hour, and a man about 1 cubic foot. What 's there to harp upon in this? It is not what a burner or a human being consumes, but the character of their respective deleterious emissions. Pettenkofer has found that pure carbonic acid in the proportion of 100 parts per 10,000 of air is not injurious to human beings; while 10 parts of carbonic acid per 10,000 of air, if derived from the respiration or perspiration of human beings, render the air of a room unfit for a person to remain in for any length of time. On this point Mr. Simpson may be reminded of something we had to say on April 6 last year (p. 19) regarding certain statements of his Chairman, Mr. F. E. Gripper. But if there is any point to be made by Mr. Simpson of Dr. Rideal's figures, he may as well know that, with different burners, the figures would change. For instance, Dr. Bunte has found that with ordinary upright incandescent burners three volumes of air are required to one of gas; and with inverted burners, two volumes of air to one of gas.

Then Mr. Simpson, dipping into the Board of Trade Departmental Report on the Metropolitan Gas Supply, quotes this sentence from the evidence of Mr. Otto Hehner, "I think it would be bad to breathe gas vitiated air, even if it were antiseptic." Mr. Hehner does not say that the use of gas by modern means does vitiate air; but that it would be bad to breathe it if it did. As, however, Mr. Simpson is of opinion that the sentence has peculiar weight, let us quote from the report on the experiments that Mr. Hehner had made and laid before the Committee: "Those who object to the products of gas combustion as regards sulphur can, by using incandescent mantles, reduce the actual amount of gas burnt to a small volume, and the sulphur thrown into the air in proportion, and yet obtain a higher amount of illumination than formerly." Again: "As the net results of these experiments, to which an immense amount of labour was given, I have to report that no measurable amount of sulphurous acid could be detected either in the outside city air, or of a room in which large amounts of coal gas had been burnt." And yet again: "I conclude that it would be utterly immaterial to the consumer of gas if the present regulations as to purification were abolished, and the amount of sulphur allowed to rise to 50 or 60 grains per 100 cubic feet." The results of the experiments show that "in an ordinary papered and whitewashed room, the sulphur oxides thrown into the air by the combustion of a gas-flame were removed so rapidly that the proportion of sulphur in the air of the room was not materially greater, and even sometimes smaller, than the total sulphur-content of the outside air." Proceeding, Professor P. F. Frankland's statement before the Departmental Committee is quoted by Mr. Simpson as to the oppressiveness of the atmosphere in a room where "a large quantity of gas is being burnt." But, of course, Mr. Simpson does not know that Professor Frankland (who recommended incandescent gas-lamps for lighting the Birmingham Art Gallery) has for years now been giving evidence in opposition to most of the progressive movement of the gas industry; and even Professor Frankland, in the Parliamentary Committee rooms this session, has had to admit that gas for lighting is not now burned in "large" quantities, but in small quantities through incandescent gas-burners. The Departmental Committee (upon which Mr. Simpson had not a seat, which was an unfortunate oversight on the part of the Home Secretary) was composed of Lord Rayleigh, Sir W. Abney, Dr. R. Farquharson, Mr. William King, and [then] Mr. J. Fletcher Moulton, K.C. The verdict of this Committee of unchallengeable eminence was this:

It does not appear that any complaints are made by the inhabitants of other districts on the ground that the gas unpurified causes injury to health, or is more destructive to articles such as leather, &c., than it is supposed to be in London. In the face of this striking fact, the Committee are of opinion that those who contend for the maintenance of the clauses relating to sulphur compounds (other than sulphuretted hydrogen) have not sufficiently shown that their abolition in the case of the London Companies would be detrimental to the public.

What has Mr. Simpson to say to this? As to quotations from the writings and sayings of Dr. Haldane (1902-3) and Sir Aston Webb, we may refer Mr. Simpson to a reply in the "Memoranda" for Dec. 14 last (p. 731), a copy of which has been sent to him for, we venture to hope, his edification. Even Dr. Haldane on the Brighton Gas Bill this session has admitted to a House of Commons Committee that the incandescent gas-burner has altered the conditions of lighting, in view of the small quantity of gas consumed to obtain the same degree of illumination. The old experiments by the learned Doctor were made with flat-flame burners, in rooms with doors and windows closed, and without fireplaces in them! Strange, but true! We still trust that Mr. Simpson will favour us with replies to the questions addressed to him in our issue for April 19; and at the same time he might express his views on the decision of the Departmental Committee, and on the additional information that has been placed by us at his disposal.

On April 19, Alderman and Mrs. Farncombe attained the jubilee anniversary of their wedding; and among the numerous presents was one from the Directors and officers of the Eastbourne Gas Company, of which Alderman Farncombe is a member of the Board. It took the form of a beautiful filigree rose-bowl, filled with roses.

NOTES FROM WESTMINSTER.

COMMITTEE room proceedings during last week were, within the scope of our interests, of a somewhat "watery" character. It will be of interest, however, to learn that the Standard Burner Bills have been before the Examiners of the House of Commons, and have been sent forward for second reading. In these days of stormy antagonism to gas companies securing any advantages, it will be interesting to readers to learn that the Middlesbrough Corporation have so far successfully carried a claim to a 12-candle power standard, as did the Corporation of Bury last session. Certain important water schemes have been before Committees; and these will be noticed next week.

Twelve-Candle Standard. The gas section of the Middlesbrough Corporation Bill was reached by the Local Legislation Committee last Wednesday. The section is short, but in one respect highly important, in that the Corporation are asking that the standard of illuminating power shall be reduced from 15 to 12 candles; thus returning to the standard that had existence for thirty years—from 1868 to 1898, in which latter year it ascended to the 15 candles. Mr. Jeeves, one of the Counsel for the promoters, put it to the Committee that "it was in the interests of the consumers" that the reduction of the standard should be made in view of luminosity as a property of gas combustion having lost its value, owing to the use of gas in incandescent burners and its extensive adoption for heating, cooking, and power. Mr. David Terrace, the Corporation Gas Engineer, gave the necessary technical testimony; and the Committee passed the clause. Local authorities who push forward the breaking-down of the effete standard are doing a good work for the gas industry generally.

Sale of Coke. When we were noticing the Bill of the Middlesbrough Corporation (referred to in the preceding paragraph) on Jan 22 last, clauses were reproduced relating to the sale of coke. The object of the clauses is the protection of consumers buying in small quantities from retailers, by having the weight or measure certified, and making it a penal offence to contravene the proposed enactment. The Board of Trade were rather opposed (when the clauses were before the Local Legislation Committee last week) to the matter being made the subject of legislation in a Private Act, thinking that it should be, if protection were necessary, incorporated in a General Act, and so have universal application. Still the Board were not altogether unfriendly, believing that Local Authorities should, at any rate, make bye-laws and regulations in regard to coke sales. The Committee, however, were sympathetic with the views of the Corporation; and, subject to revision, the clauses were passed. That is better than waiting for generations for a General Act. The text of the provisions will be found in the report of the proceedings in our "Parliamentary Intelligence."

Why not Electricity? We have been congratulating the gas industry upon the success of the Heywood and Mountain Ash stand-by clauses of last session; and of the success so far of the clauses incorporated in Bills this session. It is now clear that the Local Government Board will not raise any further objection to such clauses; but according to the proceedings on the Rhondda Bill before the Local Legislation Committee, they seem to have some dislike to the stand-by power for gas being applied to electricity as well as to private suction gas and other producer plants. Why there should be this objection is not at all plain, as it comes hard on gas suppliers if they have to lay, without proper compensation, a long length of service-pipe, and supply and maintain a large meter in a factory, merely for stand-by purposes to electricity. However, in order to please the Local Government Board, the Rhondda promoters agreed to delete from the clause the words "or electricity;" and, abbreviated to this extent, the clause stands. In the Heywood Act last session, protection was given the Gas Department against electricity.

General Law and Commonsense. Undue respect for the General Law has caused the Unopposed Bills Committee of the House of Commons to remove from the Bristol Gas Company's Bill a clause that had for its purpose, the only sensible way of dealing with consumers who have faulty gas pipes and fittings, and from which there are neglected escapes. The Company proposed, on such escapes coming to their knowledge, to give the consumer notice that if, after thirty-six hours, the escape continued, they should cut off the gas, and have power to recover any costs incurred. Gas undertakings could do with authority of this kind to assist them in protecting negligent consumers against their own folly. But the apotheosis of the General Law brought the balance of feeling of the Unopposed Bills Committee down against the commonsense proposal of the Company; and so the clause went. But the Company have succeeded with another provision that gives them the right to recover the cost of reconnection when a troublesome consumer necessitates the cutting off of the supply. Provision has also been made in the Bill to restrict the right of entry to premises for cutting-off purposes to certain hours of the day.

Electricity Powers. It will be remembered that the Unopposed Bills Committee passed the Bishops Stortford, Harlow, and Epping Bill just recently, but reserved decision on the electricity section. This, too, has now been passed; and so the measure will likely proceed without further molestation.

RETIREMENT OF MR. R. FORBES CARPENTER.

READERS will regret to learn, as we do to have to record, that, in consequence of persistent ill-health, Mr. Russell Forbes Carpenter, F.I.C., retired on the 17th ult. from the position of Chief Inspector under the Alkali Works Regulation Act. It is not necessary to refer here in any detail to Mr. Carpenter's work, as the copious extracts from his annual reports which have periodically appeared in the "JOURNAL" have afforded ample proof of the excellent manner in which his duties have been performed. Suffice it to say that, in the long period during which he has held the office, he has won the esteem of everyone with whom he has been brought into contact.

Mr. Carpenter was appointed a Sub-Inspector in January, 1882, becoming an Inspector in July, 1884, and Chief Inspector in June, 1895; so that he has held for about fifteen years the last-named position, in which he succeeded Mr. Alfred E. Fletcher. It may be remarked that Mr. Carpenter, who possessed noteworthy organizing powers, had a great deal to do with the re-drafting and consolidating of the Acts of 1881 and 1892, which resulted in the passing of the Act of 1906—one of the first measures that Mr. John Burns got through when he was put at the head of the Local Government Board. This new Act is recognized as an admirable one; and it brought within its scope a class of works whose inclusion had long been required—namely, smelting works. Great opposition was in the first place offered by manufacturers to this step; but Mr. Carpenter's tact was equal to the occasion, and everything is now going on exceedingly smoothly. Mr. Carpenter has served on the Council of the Institute of Chemistry and the National Physical Laboratory, and been Chairman of the Manchester Section of the Society of Chemical Industry.

The new Chief Inspector is Mr. William S. Curphey, who was appointed an Inspector in 1892, and has since had entire charge of the work in Scotland.

In connection with the retirement of Mr. R. Forbes Carpenter, as noted above, we learn that the Secretary for Scotland has appointed Mr. J. W. Young, B.A., B.Sc., hitherto a Sub-Inspector under the Alkali Works Regulation Acts, to the post of Inspector for Scotland.

PERSONAL.

Mr. J. T. BROUGHTON has been appointed by the Congleton Town Council Manager of the Corporation gas-works at a commencing salary of £165 per annum.

Mr. EDWARD ALLEN, M.Inst.C.E., has been elected President of the Liverpool Engineering Society—an honour not merely personal but also a recognition of the Liverpool United Gas Company as a very important factor in the life of the city.

No less than 62 applications were received for the position of Gas Engineer to the Corporation of Nelson, which has become vacant through the resignation of Mr. A. J. HOPE. The Gas Committee met last week, and reduced the number to five; and it was arranged for the final selection to be made yesterday.

Mr. JOHN FURNESS, the Manager and Secretary of the Slaithwaite Gas Company, has a long record of service as a member of the Urban District Council, having served continuously since its formation in 1894. About ten years ago, he was honoured with the position of Chairman; and the members have again shown their confidence in him by making him Chairman for the ensuing twelve months. By virtue of his office, he will take his seat on the County Bench at Huddersfield as a Justice of the Peace.

Mr. WILLIAM WALCH, Office Superintendent of the Gas Department of the Bolton Corporation, has resigned after a 52 years' connection with the undertaking, made up of 14 years with the Bolton Gas Company, and 38 years with the Corporation. In accepting the resignation, the Gas Committee, at their meeting last Friday, passed a resolution expressing regret at Mr. Walch's decision, and also placing on record grateful recognition of the valuable services rendered by him to the Gas Department. The Gas Committee have referred to a Sub-Committee the question of appointing a successor to Mr. Walch.

Mr. F. W. VANSTONE, who has had the supervision of the new water-works at Paignton during their construction, has been elected a member of the Paignton Urban District Council. At the last meeting of the Water Committee, a letter was received from Mr. Vanstone asking to be released from his engagement as Engineer of the unfinished portion of the distribution scheme, and stating that his son (Mr. F. W. E. Vanstone) was willing to take over the responsibility and carry out the scheme. The Committee decided to release Mr. Vanstone from his agreement, provided that all plans, drawings, records, bills of quantities, and other documents in his possession relating to the water undertaking were handed over to the Council. As a Water Engineer has recently been appointed, the Committee did not see their way to offer Mr. F. W. E. Vanstone his father's position. The Council confirmed the action of the Committee,

OBITUARY.

The death, after a short illness, is announced of Herr HANS RICHTER, who was 42 years of age. The deceased, who died at Kiel, was, it is said, the originator of the four-cycle double-acting gas-engine.

Mr. JOHN IRELAND, late Manager and Secretary of the Ferry-Port-on-Craig Gaslight Company, Limited, died at his residence in Tayport, Fifeshire, on the 23rd ult., in his 79th year. Mr. Ireland was for fifty years in the employ of the Gas Company. In September last, the Corporation acquired the undertaking of the Company; and Mr. Ireland retired from office at the beginning of this year.

It is with regret that we have to record the death, which took place last Sunday week, of Mr. THOMAS MAY, senior, who had reached the ripe age of 81. He was connected with the gas industry for about fifty-five years; having occupied the position of Manager of the Ramsgate Gas-Works from 1855 to 1870, when he left (being succeeded by the late Mr. W. A. Valon) to take up a similar position with the Canterbury Gas and Water Company. There he remained for some thirty years, at the end of which time he retired from active service, though his assistance was retained by the Company in a consultative capacity. In past years, Mr. May was largely consulted by many of the Kentish gas companies; and at the time of his death he was a Director of the Broadstairs Gas Company, a position which he had occupied for over fifty years. The funeral took place at St. Martin's, Canterbury, on Thursday. Sympathy will be felt by a large circle of friends with Mr. Thomas May, jun., the Engineer and Secretary of the Richmond Gas Company, in his bereavement.

THE PATENT OFFICE IN 1909.

THE Twenty-Seventh Annual Report of the Comptroller-General of Patents, Designs, and Trade Marks, for the year 1909 (which on this occasion bears a different signature from that to which we have become accustomed—Sir C. M. Dalton having been succeeded by Mr. W. Temple Franks), opens with a brief survey of the history of legislation in regard to patents and designs, with special reference to the existing duties and work of the Patent Office and the jurisdiction of the Comptroller.

In this review, we are informed that the earliest important Statute in regard to patents was the Statute of Monopolies, in the time of James I., which abolished all monopolies except "letters patent and grants of privilege for the term of fourteen years or under, hereafter to be made, of the sole working or making of any manner of new manufactures within the realm, to the true and first inventor." After this enactment, no material alteration was made in patent law or practice until the year 1835, when Lord Brougham's Act enabled a patentee for the first time to amend his specification by way of disclaimer or alteration, and gave the Privy Council the power of prolonging the term of a patent in certain cases from fourteen to twenty-one years. In those days the securing of a patent was not a step to be lightly undertaken; for it involved a serious call upon the purse of the applicant. In 1852, the procedure was greatly simplified, and the fees were reduced—though they still remained heavy enough to constitute a serious tax on inventors. By an Act passed in the year named, a patent was made to extend for the first time to the whole of the United Kingdom; and the total fees payable amounted to £175. Previously, three separate patents had to be taken out for England, Scotland, and Ireland respectively; and the total fees usually exceeded £400. The Act also contained other important provisions. One of these prohibited the old practice of including more than a single invention in one patent. Under the Patents, Designs, and Trade Marks Act of 1883, the present Patent Office was established and placed under the immediate supervision of a Comptroller-General, acting under the superintendence and direction of the Board of Trade; and in 1902 power was given to the Examiners to make an investigation "for the purpose of ascertaining whether an invention claimed had been wholly or partly claimed or described in any complete specification published before the date of the application, and left pursuant to any application for a patent in the United Kingdom within the preceding fifty years." The Comptroller was further authorized, on an Examiner's report, and after hearing the applicant, to insert in the specification a reference to prior specifications which appeared to claim or describe the invention. Another Act was passed in 1907, which, besides consolidating the law, contained various provisions, the most important of which gave the Comptroller power at any time after four years from the date of a patent to revoke it on the grounds that the patented article or process was manufactured or carried on exclusively or mainly outside the United Kingdom. This was in reality merely an extension of a principle which had been adopted in previous Acts. For instance, by the Act of 1902, power was expressly given to the Judicial Committee of the Privy Council to revoke a patent worked mainly or exclusively abroad, "if the reasonable requirements of the public in the invention were not satisfied in this country." The new section has, however, created widespread interest; and considerable prominence to proceedings under it has been given in the columns of the newspaper Press. There have already been 73 applications

to revoke; and 17 of the patents have been actually revoked. A special point is made of the fact that an application to revoke the same patent may be repeated on any number of occasions, if new facts emerge or fresh grounds for revocation arise.

On turning to the particulars of last year's work of the Patent Office itself, it is noticed that the number of applications for patents in 1909 (30,603) was larger than that in any other of the past ten years; though the number of complete specifications filed has been exceeded on two occasions. The figures for the last four years have been: 1906—applications, 30,030; complete specifications filed, 18,243. 1907—28,915 and 18,829. 1908—28,598 and 17,746. 1909—30,603 and 18,705. The number of applications received from women inventors was 648, which is an improvement on the 572 of the previous year; though even now the figure shows that there is one direction at least in which the unenfranchised portion of the population still play a comparatively unimportant part. Of the total number of applications for patents, 19,878 were received from persons resident in England and Wales, 1308 from Scotland, and 314 from Ireland. The applications from most of the British Colonies were about equal in number to those made in 1908; but those from Canada show a large increase. There is a decrease in the number of applications received from Austria, Belgium, Denmark, France, Germany, Holland, Italy, and Spain; and an increase in those from Russia and the United States. The applications from Germany numbered 3038, compared with 3059 in 1908; from the United States, 2787, against 2644; and from France, 997, against 1056. The number of patents sealed in 1907 was 16,190, or 55·9 per cent. of the applications; and out of 14,170 patents sealed upon the applications made in the year 1895, 470, or 3·3 per cent., were maintained for the full period of fourteen years. The number of patents which expired in 1909 was 15,276; and the total number of new patents sealed, 15,065. Thus the number of patents in force was decreased during the year by 211.

As to the examination of the complete specifications under the provisions of the Act already referred to, it is remarked in the report that the number of cases where the complete specification is reported as wholly anticipated or not anticipated at all is decreasing year by year; while those where it is reported as partially anticipated are increasing. It also appears that there is a growing tendency to meet the reported anticipation by an amendment of the specification; and there is a consequent decline in the number of cases in which a reference to a previous specification is inserted. The number of such references inserted in the specifications of 1908 was only 310, as against 426 and 523 in those of 1907 and 1906 respectively. The number of applications made for the revocation of patents worked exclusively or mainly outside the United Kingdom was 55; but 27 of these were subsequently abandoned. In eleven of the remaining cases the patent was revoked, in five the application was dismissed, in one the patent expired after proceedings had been begun, and eleven cases are still pending. Nine petitions for the extension of the term of patents were lodged in 1909. Of these, five were abandoned, and two dismissed; the remaining two cases being still undecided. There are now four patents in force which have been prolonged beyond the usual period of fourteen years.

Referring to the subject-matter of the patents, the report says that one of the outstanding features of the year is the enormous development in aeronautics. The subject of locomotion in general, though continuing the slight falling-off noticeable during the past few years, still occupies the most prominent position in the field of inventive activity; while the interest shown by patentees in the development of the internal combustion engine has been more than maintained. Inventions dealing with the mechanical handling of materials by conveyors and transporters are much in evidence; while "problems relating to lighting have been a prolific source of invention—especially with regard to vapour or self-generating gas lamps, and to means for automatically lighting and extinguishing street-lamps." The classification of published complete specifications (at one time a feature of the report) is again absent on this occasion; so it is impossible to go further into the details of the subject-matter of the various patents.

Last year the receipts from patents fees were £267,985, compared with £262,890 in 1908; from designs fees, £5578, against £5189; and from trade marks fees, £17,247, compared with £17,358. The receipts from sales of publications were £12,029—making the total receipts £302,839, against £297,335 for the preceding year, an increase of £5504. The expenditure, £208,536, also exhibits an increase of £29,005.

"The Sale of Gas Apparatus."—This is the title of a booklet which the author, Mr. J. Pater Wiatt, has written in the hope that it will be found useful to the many officials employed in the gas industry whose duties lie either in the sales or the distribution department. Due acknowledgment is made by him of the sources of some of the information, as well as of assistance received from various friends in the compilation of the work. The contents are divided into twelve chapters; and the subjects selected for treatment are ones which the author believes will be helpful to those who are engaged in show-rooms or similar positions. The information given is not, of course, intended to be of an advanced character. If it were so, the very object of the work would be defeated. Rather is it sought to offer "wrinkles" to those who may require them. The price of the booklet is 1s.; and it is published at the offices of the "JOURNAL."

PRODUCER GAS-FIRED FURNACES.*

INDUSTRIAL progress demands that it should be realized as widely as possible that a ton of coal, and in fact any other fuel, can be made to do far more work after its conversion into gas than it could used as a solid fuel with direct firing. In this book it is the author's purpose to give detailed descriptions and practical illustrations of the various types of gas-fired furnaces used in the chemical and engineering industries. The author rightly points out that, by using a producer, it is possible to replace high-grade coals by low-grade fuels, which could not otherwise be used owing to a high percentage of ash rendering combustion in a direct-fired furnace entirely impossible.

In the first chapter, on "The Generation of Producer Gas," the author states that "the height of the fuel-bed in producers necessary for complete reduction varies with the quality of the fuels used. Dusty fuels require less height than coarse, loose fuels. The proper height for 1-inch coke is 30 inches; for 1½-inch coke, 45 inches; for 2¼-inch coke, 72 inches. This is undoubtedly a fact; but the size of fuel to be used is a detail which is often overlooked in the design of a producer.

In a chapter on the "Construction of Gas Producers," the author shows, by means of some excellent illustrations, a variety of designs; and he briefly describes their characteristics. It is noticed that producers are almost invariably fitted with bell-hoppers, so that continuous working without the necessity of waiting during charging operations is rendered possible. This arrangement might with advantage be fitted to water-gas plants. Various devices are also described and illustrated, by means of which the removal of ashes is mechanically effected. A further arrangement which increases the efficiency of the producer is the mechanical poker. Many other ingenious methods of ensuring the maximum of efficiency from the producer are shown in this chapter. The combustion of producer gas and one or two methods of mixing gas and air for combustion are briefly discussed. The author next deals with some types of furnaces used in the various chemical industries—including the Schilling-Bunte furnace for heating retort-settings. An interesting illustration is given of a producer-gas-fired boiler plant; and to those who are aware of the economies of gaseous firing as compared with direct firing, it seems incredible that so-called up-to-date boiler plant still provides for direct instead of gaseous firing. In the subsequent five chapters are described typical producer furnaces used in the metal, iron and steel, lime and cement, glass, and brick and ceramic industries. Much information of a concise and comprehensive nature is given in these chapters; and a thorough grasp of the subject is rendered infinitely more easy by the inclusion of a large number of self-explanatory illustrations.

An excellent chapter is that on the "Selection of Refractories," some of which is, in a general way, of interest to gas engineers; and the same may be said of the rest of the work. The author concludes the book with an appendix on the "Purification and Recovery of Gases" and "Gas Power." The whole subject is adequately treated in a clear style; and the work may be commended to those who wish to make a special study of producers. A perusal, however, gives one the impression that the readers of the book will be somewhat limited in number.

* "Producer Gas-Fired Furnaces." By Oskar Nagel, Ph.D., Consulting Chemical Engineer; Author of "Mechanical Appliances." Published by the Author: New York; 1909.

M. GREBEL ON NEW CARBONIZING METHODS.

A RECENT number of "Le Génie Civil" contains the first portion of an article by M. Grebel—whose name is known to many of our readers in connection with his communications to the Société Technique du Gaz, of which he is a member, as well as to some of our French contemporaries—in which he offers some observations on modern methods of carbonization. The subject-matter has, for the most part, appeared from time to time in our columns; but it will be of interest to indicate briefly the scope of the author's work, as, in a measure, it is supplemental to that of M. Marquisan, whose paper read before the French Society of Civil Engineers about two years ago was noticed at the time.

M. Grebel opens with a few historical particulars, in the course of which he points out that during the past three years a number of new systems of carbonizing coal have made their appearance, the principal object of which is the reduction of manual labour. While many of them recall the first conceptions of Murdoch, who tried, in the early days of the gas industry, horizontal, inclined, and vertical retorts, their principal characteristics are the lengthening of the duration of the charge, and, as a consequence, the increase of its weight. The feature of the old retort-setting was the distillation of the coal in from 4 hrs. 48 mins. to six hours, and that of the original coke-oven, the coking of the coal in several days; whereas now the tendency is to work off the charge in 24 hours, both in chamber settings and modern coke-ovens.

After this introduction, the author proceeds to classify, in tabular form, the different methods in use for the distillation of coal, on the basis of the normal minimum duration of the charge. The

first group, in which the charge is worked off in 4 hrs. 48 mins., comprises ordinary horizontal, inclined (Coze), and vertical retorts; the second, in which the time occupied is from 10 to 12 hours, includes the Bolz, Bueb, Young-Glover Love, and Klönne systems; the third, in which 24 hours are required, consists of the Klönne (Rotterdam), Koppers, and Ries (Munich) systems. All the methods of carbonization named, including the Woodall-Duckham, are shown on a plate forming a supplement to the above-named publication.

The author then passes on to offer some general remarks on the several systems of settings he has mentioned. He acknowledges that he has been captivated by the principle of continuity, which it would seem should be the object of all processes employed in industrial chemistry. Nevertheless, as the result of practical experience, he cannot but regard as utopian the continuous vertical retort, furnished with mechanism for the admission of the coal and the removal of the coke at certain longer or shorter intervals. If the idea is simple, its realization, in M. Grebel's opinion, is extremely difficult, inasmuch as it involves practical problems of a very complex and delicate nature. As long ago as 1897, he showed by experiment that the "pasty" condition into which nearly all coals pass in the course of coking interferes with their progressive descent. This he considers sufficient to condemn the continuous vertical retort, except when certain special English coals which are suitable for it can be procured. With regard to the Settle-Padfield and Young-Glover systems, he says that if they have not, like that of MM. Verdier and Teulon, been actually abandoned, they have not "entered the domain of practice." As to the inclined retort, it appears to have had its day; while the vertical retorts of Bolz and Klönne and the "45's" of Love and Genotte, though working very well, represent, according to M. Grebel, only a transitory solution of the problem. He acknowledges, however, that the Bueb system leaves nothing to be desired. The Dessau settings have captivated a good many gas engineers because they have behind them a past which is wanting in more recent systems of distillation in 24 hours. On the other hand, they dispense with only a portion of the manual labour, they produce a gas which is only of just the standard quality, and they yield a coke of 50 kilos. per hectolitre (2·75 bushels) which is neither the 40-kilo. coke from ordinary retorts nor the 60-kilo. metallurgic coke coming from carbonizing chambers. All things considered, M. Grebel is of opinion that the lower cost and the certainty in operation of ordinary horizontal retorts 10 feet long will always ensure for them the supremacy in small works, where only one or two units of five to nine retorts are needed to produce the quantity of gas required. In connection with these retorts, only hand charging-machines may be employed. M. Grebel thinks the 20-feet through retort, designed to allow of entirely mechanical charging and discharging, will be superseded by newer appliances which better fulfil this condition.

Turning to the future of coal carbonization, M. Grebel considers that what has taken place during the past three years has shown that the modern coke-oven is the right system of dealing with a large bulk of coal; and that all that is required to render it an excellent producer of both gas and coke is to ensure its soundness, and heat it by generator gas. He expresses his gratification at finding his former predictions in this respect, which were combated at the time—especially in regard to the use of horizontal chambers—are now being verified. Especially is this shown by the action of Herr Aug. Klönne, of Dortmund, who, as the outcome of experiments extending back to 1892, rarely advises the employment of vertical chambers in small works, but recommends horizontal ones. In support of this statement, the author mentions that during the past two years Herr Klönne has put up eight installations of horizontals, which are at work, and capable of carbonizing 400 metric tons of coal per day, compared with two on the inclined and one on the vertical system. Seeing that the firm named construct vertical, inclined, and horizontal chamber settings, M. Grebel submits that their preference for the last-named type is worthy of consideration.

The author concludes his article by describing the horizontal chamber setting at Rotterdam, and explaining its operation by the aid of the section of the setting shown on the supplemental plate already referred to. He also gives some views of the first inclined chamber settings at Königsberg and of the vertical chambers at Dortmund, which were illustrated in the "JOURNAL" for June 22 last year (p. 837). He promises to give in the second portion of the article a description of the first setting of horizontal chambers put up in France—viz., at Versailles—which will be at work in the course of the current year; and he will then deal in detail with the advantages of this system, from the point of view of its convenience and economy.

Wales and Monmouthshire District Institution of Gas Engineers and Managers.—The May meeting of the Association, we are informed by the Hon. Secretary (Mr. Octavius Thomas), will be held on Wednesday of next week (the 11th inst.) at Cardiff, under the presidency of Mr. A. H. Brookman, of Tenby. The business will consist of the election of officers for the ensuing year; a paper by Mr. T. Acland, of Llanelly; and a discussion on the "Formation of Classes for Gas Engineering and Supply," to be opened by Mr. H. D. Madden, of Cardiff. After the meeting, the members will be the guests at luncheon of the Chairman and Directors of the Cardiff Gas Company; and subsequently the Grangetown works will be visited.

BRUSSELS INTERNATIONAL EXHIBITION.

The British Display.

THE receipt from the Board of Trade (Exhibitions Branch) of a copy of the official catalogue of the goods that are being shown by British firms at the Brussels International Exhibition—which was opened by the King and Queen of the Belgians on April 23—enables us to refer to some of the displays in the branches of industry with which our readers are more particularly concerned. The British Industrial Hall occupies an area of 150,640 square feet, and forms part of the building which contains also the Belgian exhibits; while the space allotted to Great Britain in the Machinery Hall has an area of 64,000 square feet, and is situated in the middle of the hall. It may be mentioned that the British catalogue contains the names of nearly four hundred firms; and their exhibits are classified into 22 groups, and sub-divided into 128 classes.

First of all, taking the names in alphabetical order, we notice that Messrs. William Asquith, Limited, show drilling and tapping machines. From the British Cyanides Company there are cyanide of soda and ferrocyanides of soda and potash. The Cambridge Scientific Instrument Company exhibit the pyrometers, calorimeters, and other testing and recording appliances with which their name has become so closely associated; and Messrs. Crossley Bros. and the Campbell Gas-Engine Company, their particular makes of engines and suction-gas plants. Coalite, Limited, are taking the opportunity to make the Belgian people acquainted with "the new smokeless fuel obtained by the low-temperature distillation of coal." To gas heating and cooking appliances, fireplaces, gas and oil laboratory appliances and furnaces, water-heaters, &c., attention is drawn by Messrs. Fletcher, Russell, and Co. The Gaslight and Coke Company exhibit bye-products of gas manufacture; and the Glenboig Union Fire-Clay Company, fire-bricks, blocks, and gas-retorts. The Boys and the Mahler-Cook bomb calorimeters are to be seen at the stand of Messrs. J. J. Griffin and Sons; and Messrs. William Kenyon and Sons show specialities in gas and water tools, &c.

The National Gas-Engine Company have one of their engines and suction producer gas plants; and the Power Gas Corporation, suction-pressure gas producer plant, and a model of Mond gas plant, with sulphate of ammonia recovery apparatus, and samples of combustibles and products. The Humphrey internal combustion pump, which has lately been fully described in the "JOURNAL," is exhibited by the Pump and Power Company. The pump which is shown in operation is designed to lift 250,000 gallons of water per hour to a height of 35 feet. The pump has none of the usual moving parts—no piston, crankshaft, or flywheel, no non-return valve in the delivery pipe, and no glands. The only working parts are the water valves and the admission and exhaust valves. There is a suction-gas engine and generator by Messrs. Ruston, Proctor, and Co.

Under the name of the South Metropolitan Gas Company, there are sulphate of ammonia and coal-tar pitch for making briquettes; while the Sturtevant Engineering Company demonstrate applications of blowing and exhausting fans. Messrs. Townson and Mercer show some gas analysis apparatus.

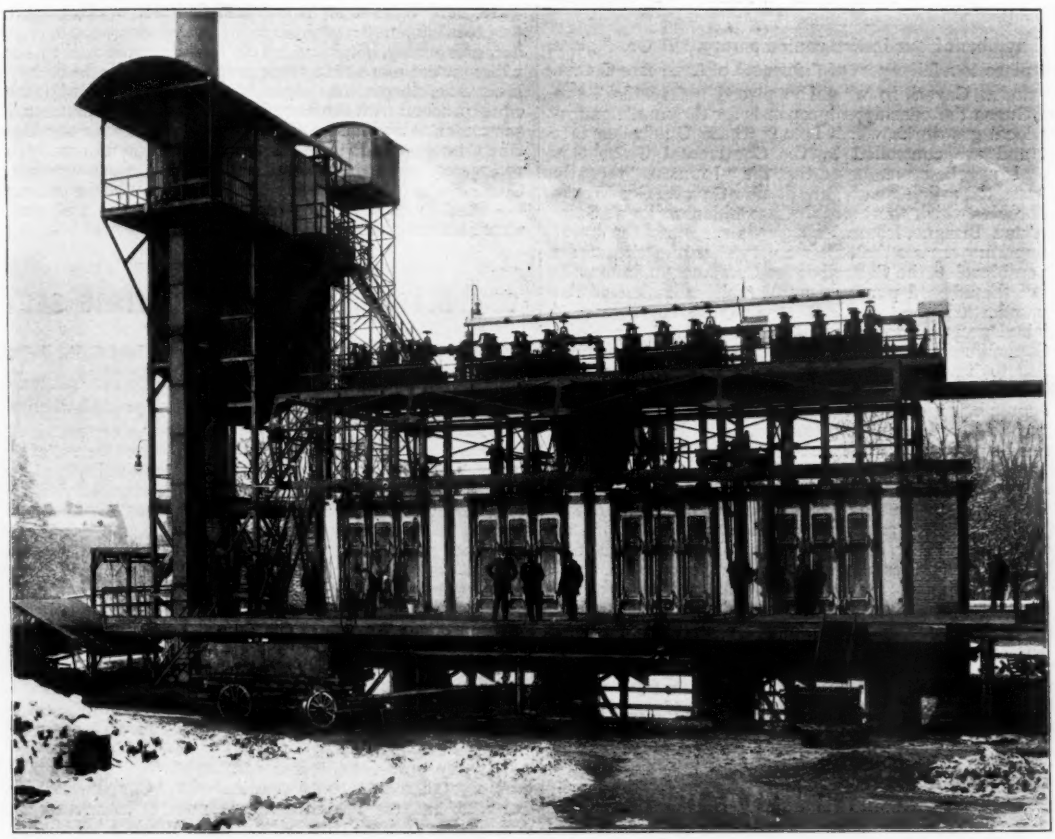
In the Mining and Metallurgy group, gas coal finds mention in connection with numerous exhibits—those, for instance, of Messrs. T. W. Dance, Son, and Hunter; the Hamsterley Colliery; the Horden Collieries; Messrs. James Joicey and Co.; the Lambton Collieries; the North Walbottle Coal Company; the Priestman Collieries; Messrs. U. A. Ritson and Sons; the Seaton Burn Coal Company; and the Stella Coal Company.

Heathfield Once More.

Renewed efforts are being made to get the public into the shares of the South of England Natural Gas and Petroleum Company, Limited—which has been formed to revive the Heathfield natural gas fiasco of some few years ago. Possibly it is hoped that the wide interest now being taken in the exploitation of new oil fields may make the task of securing applications easier than it has hitherto proved. In yesterday's "Daily Mail" a whole page was occupied by an illustrated description of the "discovery," written from information supplied by the Company; and in another part of the issue was the Abridged Prospectus. We saw this document—or one very much like it—in February, and commented upon it in our issue of March 1 (p. 563). The capital was then fixed at £20,000; and it seems that £16,000 of shares are still available. The "ordinary" portion is offered at a premium! In addition, £5000 of first mortgage debentures are offered. Clearly, the response to the flood of prospectuses issued earlier in the year was unsatisfactory; and if investors have any memory at all, the same fate will wait upon the present appeal.

Compulsory Working of Patents.—Under the title of "Compulsory Working and Revocation of Patents" (Stevens and Sons; 3s. 6d.), Mr. Ernest Lunge has written a work dealing with two vexed questions arising out of the Patent Act, 1907. His pages contain a historical sketch and a practical guide covering every matter connected with the law and practice under section 27, so far as the words of the Statute, the patents rules of the Board of Trade, the rules of the Supreme Court, and the decisions of the Courts which have dealt with the section, afford any authentic materials.

HORIZONTAL CARBONIZING CHAMBERS FOR THE WHOLE GAS SUPPLY OF A TOWN.



Installation of Twelve Horizontal Koppers Chambers at Innsbruck.

THERE appeared in our last issue a translation of a report by Herr O. Peischer, the Manager of the Innsbruck Corporation Gas-Works, as to the results of three months' experience with the town supply of gas exclusively by manufacture in large horizonal carbonizing chambers or ovens. The former carbonizing plant is being replaced by new plant of a productive capacity of 15,000 cubic metres (529,724 cubic feet) per diem. Ultimately there will be six beds of horizontal carbonizing chambers on the Koppers system. But up to the present time four beds, each containing three chambers, have been erected. Of these, we are now in a position to give an excellent illustration; and for the dimensions and full particulars of the results obtained, readers are referred to the article which appeared on p. 231 of last Tuesday's "JOURNAL."

A NEW WATER-HEATER.

WHEN noticing the gas apparatus on view at the recent "Ideal Home Exhibition" at Olympia, reference was made to a new pattern circulator which was then for the first time exhibited by the Parkinson Stove Company, Limited. The "Hydrotherm" water-heater—for so the appliance has been named—though specially designed for general house supply, is also suitable for other purposes, and is stated to be remarkably efficient in action. In fact, in designing water-heaters efficiency is no more than one would expect, in view of the wide experience in this direction of the firm, with whom, as is well known, are incorporated Maughan's Patent Geyser Company.

The "Hydrotherm" Water-Heater.

In the first place, the "Hydrotherm" is entirely automatic in action. In whatever part of a building it may be placed, the turning on of a tap connected with it in any portion of the premises automatically causes the gas-valve to open. The gas is lit by a pilot, and hot water is delivered in a few seconds, after which it continues to flow as long as a tap remains open. On the tap being closed, the valve again shuts off the gas, and leaves only the pilot. This light is, of course, quite a small affair; the quantity of gas consumed by it being only about 1 cubic foot per hour. In designing the automatic gas and water valve, care has been taken to make it perfectly free in operation, with a minimum of friction, in order to obviate any possibility of the movement getting fixed. The working parts are accessible for repair when necessary, without interfering with the various connections—the valve being protected by a removable cover.

That the "Hydrotherm" is made throughout in a very substantial manner, will be understood when it is remarked that it is tested to a pressure of 150 lbs. per square inch—which means that, if desired (and if allowed), the apparatus could safely be connected direct with the water-main. The heating section is of solid-drawn copper tube, of stout gauge, the efficiency of which is much enhanced by a system of heat conductors. The coil of tube is enclosed in a chimney of strong galvanized iron, which is covered by a copper exterior case, polished and lacquered. These cases can be removed without disturbing any of the gas and water connections, thus enabling the coil to be cleaned, if needful, without the attention of a skilled workman. The base is of cast iron (except in the smallest size), to which all the fittings are attached; and the burner is also of cast iron, and fitted with special luminous jets. A door in the base affords facility for lighting the pilot jet and cleaning the burner, which may be entirely removed without disconnecting any of the gas and water fittings. The heater can be connected up to any existing house services.

The advantages of being able to obtain a supply of hot water in any quantity, with a consumption of fuel proportionate to the amount of water used, are now too well recognized to need emphasis here. Appliances which offer these advantages are assured of due consideration; and therefore the claims of the "Hydrotherm" are not likely to be overlooked. Surely, a hot bath of 30 gallons, with a consumption of about 25 cubic feet of gas (which would cost less than 1d. with gas at anything under 3s. 4d. per 1000 cubic feet), should meet the views of the most exacting customer of a gas undertaking; and this is the efficiency which the makers state is attained by the "Hydrotherm."

PROPOSED MUNICIPALIZATION OF THE GAS-WORKS AT GENOA.

THE April number of our Italian contemporary, "Il Gaz" gives prominent place to a full report of the speech of Assessore Comm. Avv. Alessandro Caveri, in which he placed before the Town Council of Genoa the considered proposals for the municipalization of the local gas-works, which belong to the Union des Gaz Company, and are controlled by the Continental Union Gas Company. It may be remembered that the "JOURNAL" recently gave an illustrated article relating to the new Gavette Gas-Works at Genoa, besides which there are the two older works at Sampierdarena and Bisagno, from which gas is sent into the town. Our contemporary reports that, after a very short and superficial discussion on March 6, the Council of the Commune unanimously approved of the advised purchase and municipalization of the Genoa gas undertaking.

The original proposal dates back to Feb. 10, 1908, when the Genoese Council unanimously determined to go into the question, and decided to have the expert technical advice of Sigg. Ing. Broccardi and Ing. Tondi. "Our citizens," said Sig. Caveri, "are the supreme judges, and, being called upon to decide this question as the ultimate court of appeal, have the right to be fully informed upon it." The speaker then proceeded to deal with the general aspects and propositions of municipalization, which now, fortunately, had passed from the field of theory into the field of fact. The first half of last century had been the period of individual enterprise and of the competitive spirit of commerce. To-day other ideas and principles had come into view. Out of the memories of ancient cities now arose the driving needs of modern towns, among which was the question of the municipalization of public services, and more especially those of a monopolistic character—for example, public lighting, which, to be carried on by private hands, required a concession from the Commune for the right to occupy the subsoil of the public roads. From the terrain of fact, Italy was, perhaps, the first to pass to the terrain of legal right, by reason of the laws and regulations authorizing the municipalization of public services. This was the law which to-day had to be applied; and it was a great step in the path of progress and of civilization.

After further like general observations, results of the municipalization of gas undertakings were cited, commencing with England, the country "the most convinced of the benefits of the practice." The profits of Birmingham, Leicester, Manchester, and Salford were given. In Germany, the municipal lighting service of Berlin provided a net return of over 4 million marks. In Switzerland, the Company having the lighting concession of Geneva paid 30,000 lire annually to the city. Parenthetically, the Union des Gaz Company, during its 53 years, had not contributed one centime to Genoa from its exploitation of this valuable industry; while at Geneva, in 1908, when the gas-works were municipalized, the net profits amounted to 575,000 lire. Basle, Berne, and Zürich were also mentioned. In Belgium, Brussels, in 1903, besides getting its public lighting for nothing, received 44,030,000 lire into the coffers of its gas undertaking. So, too, Amsterdam, with 1,462,000 lire; Cologne, with 1,538,000 lire; Copenhagen, with 1,478,000 lire; Leipzig, with 966,000 lire; Prague, with 614,000 lire; Stockholm, with 1,063,000 lire; and Vienna, with 3,596,000 lire.

In Italy, the figures were less. At Padua, the Società Lionese charged 38 centimes per cubic metre for its gas. In 1897, the Commune took over the service, and reduced the price to 20 centimes, and the following year saved 35,000 lire out of the 85,000 lire it paid to the Società for the public lighting. In 1909, the price of gas was reduced to 11 centimes for public lighting, and 18 centimes for private use. At Spezzia, the Communal profits were 20,312 lire; at Como, 118,298 lire; at Bologna, in 1909, 106,000 lire; at Pisa, in 1907, 37,747 lire, with an increase of gas consumption after municipalization of 8·64 per cent.; at Leghorn, 132,000 lire; at Trieste, 419,000 lire. Such figures supported the proposal made. The experience of Genoa, also, in regard to the public services which had been municipalized, was as favourable—public markets, posting, and street cleaning.

After setting out the legal requirements preparatory to municipalization, and showing that they had been complied with, the financial question was considered, in order to ascertain what was the indemnity to be given to the Gas Company for the acquisition of their undertaking. The enactment of 1903 required "a just indemnity" (*indennità equa*) to be paid, taking into account the industrial value of the plant, the duration of the concession, and other considerations duly set out, and, in addition, the profit which will be taken from those giving up the concession, or, in other words, "the surrendered profits" (*lucro cessante*). The legal interpretation to be given to these words was next considered; but this need not detain us here. Suffice it to say that, in fact, the concession of the Union des Gaz Company commenced from March, 1857; that it was for 67 years, of which 53 have run their course. The industrial value of the plant, say the experts, should be equal to what it would cost to put up a convenient installation, taking into account the depreciation of the plant. Also, in the municipal contract with the Union des Gaz Company, it is provided that, at the end of the concession, the mains become the property of the Commune without the payment of any indemnity for them. In short, the figure of 8,288,885 lire (say £331,555) is arrived at as representing the industrial value of the plant. Adding to this sum what is alleged to be requisite for the surrendered profits, the total becomes 10,473,000 lire or about £418,920. With some further additions, for working capital, &c., the total amount required to be found amounts to 11,972,310 lire, or, roughly, £478,892. This sum it is proposed to obtain by a loan at not more than 5 per cent., redeemable in twenty years. It was, therefore, ultimately and unanimously decided by the Council to proceed with the exercise of their right to municipalize the gas undertaking; and, failing an agreement with the Union des Gaz Company as to the sum mentioned as the indemnity (namely, 10,473,000 lire), to nominate Sig. Ing. Eugenio Broccardi as the Council's Arbitrator, leaving the Gas Company to nominate theirs—a third to be chosen by the President of the Tribunal before whom the arbitration will be heard.

COMPETITION IN PUBLIC LIGHTING SERVICE.

By NORTON H. HUMPHRYS, Assoc.M.Inst.C.E., F.C.S.

THERE has been a noticeable change in public opinion on this subject, compared with the ideas that prevailed when gas was first introduced to the public. Where is the cry round which so many a fierce combat raged in the past—the interest of the consumer? Where is the loud-voiced, many-adjectived agitator, who talked about vampires fattening on the public vitals, robbers who were wary enough to evade the meshes of the law, and so forth, who achieved notoriety by violence and extravagance of metaphor rather than by accurate facts? Where are those who insisted on the right of the poor man to be supplied at the same price as the rich one? It may be said that the public are now better educated, and have seen that a public monopoly can be so controlled by regulations as to do as much for the advantage of the consumer as for the profit of the owner. But the pendulum now tends to swing the other way; and instances could be quoted of arrangements being allowed to pass into law that are decidedly not in the interest of the consumer—and this with the complacent approval of those who claim to represent and to protect the interests of the public.

In some towns, the representation of the consumers' interest was crystallized by the formation of a "Consumers" gas company, formed expressly for the purpose of competing with, and forcing the hand of, the existing gas suppliers. The title is still retained as a matter of form; but there is no distinctive line of action that is indicated thereby. The "Consumers" company is run on exactly the same lines as any other. The last twenty years have witnessed the establishment of many electricity supply companies; but not one of these has claimed to be established in the interest of the consumer, or to be a consumers' company. In many small towns, indeed, they have been forced on the public by outside speculators, rather than promoted locally in obedience to an evident demand. Only a few days ago, before a Parliamentary Committee, there was considerable doubt as to whether any decided demand for electricity existed in a small provincial town.

Among the numerous inducements that have been dangled before the public, like the proverbial bunch of carrots, the interest of the consumer has had no place. The tendency has been in the other direction. One occasionally hears a confident anticipation that the influence of the new-comer will have such a marked effect on the consumption of gas as to necessitate an increase in the selling price. After all that can be done in the way of cutting working costs, it is actually supposed and hoped that the gas company will find themselves between the Scylla of no profits available for interest on capital investment, and the Charybdis of a higher selling price with the risk of further loss of trade. I have never been able to understand why there should be any cause for jubilation, either in an advanced price of gas or in a lessened dividend for the shareholders. At the time when "the poor man's interest" was a fierce party cry, such interest barely existed in fact, because the poor man could not afford gas appliances, and was not inclined to fit up his weekly tenement with them. It was not till the door of the prepayment meter was opened that the poor man figured to any extent on the ledgers of a gas company. There never was a time when the need of cheap gas was more pressing, from the poor man's point of view, than to-day. A substantial increase in the price of gas would be a national calamity, entailing widespread hardship and distress.

As much may be said with regard to a sweeping reduction in gas dividends. No doubt some of the owners of the 150 millions sterling, or thereabouts, that is invested in gas securities in the United Kingdom, are wealthy persons to whom a reduction of dividend is not a vital matter. But the poor man or woman figures to quite as large an extent in the list of shareholders as in the gas-rental ledger. The small trader has put his trifling surpluses—the only provision he is able to make against old age or bad trade—and the widow or elderly spinster has invested her small means of support, in the local gas-works, regarding this as a safe investment that comes to some extent under her own personal knowledge. This class of investors have no great faith in the Stock Exchange, or in home or foreign securities. They do not understand such things, and therefore they prefer the local ventures. Half cottage property, half gas shares, is a favourite custom. It would be difficult to exaggerate the suffering

and privation that would be caused to these small investors by a reduction of (say) one-half the dividend. There is room for congratulation in the fact that nothing of this kind has obtained in practice, and that no competitor strong enough to prejudice the value of gas property to any important extent has yet loomed in sight. But it is strange the descendants of those who attached so much importance to the interests of the consumer should now allow competitive schemes to come into existence without any opposition or exposure of the fallacy involved.

The point is especially evident in connection with the operations that come under the category of Municipal Trading, which in theory is supposed to be conducted primarily, if not entirely, in the interest of the consumer. The municipal body, in theory, possesses a soul that does not stoop to the vulgar instincts of personal profit which are the chief consideration to the private trader. There is a certain amount of sympathy between the objects of the municipal gas undertaking and the consumers' gas company in that both claim to be actuated by philanthropic motives, and to desire to advance the welfare of the consumer by furnishing him with a good article at cost price. The resemblance goes farther, because it rarely happens that either the municipality or the consumers' company live up to their pretensions. The shareholders in the latter have quite as strong a faith in the full standard dividend as those in any other company, and take care to elect directors who will faithfully look after their interests; while the finance committee of the municipal body can always find means for disposing of large sums, as the phrase goes, for the "relief of the rates"—an expression that rarely represents fact. The assessment in the so-called rate-aided district is not substantially lower than in any other; and the so-called "relief" may go to pay for extravagances that would not be indulged in if they had to be submitted to the public vote, or to cover deficits in other ventures.

So far as the consumer is concerned, his interests are as well, if not better, served by a progressive, soundly managed company, who know that their own interests and the security of their business can be best assured by a cheap and efficient service, as when his requirements are served by the local authority or the consumers' company, who claim to make his interests the first consideration. A joint-stock company has a much thinner skin, and in many ways can be brought to book in a manner that does not apply to the municipal authority. Who ever heard of a town council or a local board being fined for supplying bad gas? If the consumer is ever inclined to look closely into the selling price of gas, he has in the balance-sheet of the company a plain statement of the income and expenditure; whereas the borough accounts are usually of a more complicated nature, and are apt to be directly or indirectly mixed up with other matters. The gas undertaking may be a success; but other ventures are not so fortunate. It is very difficult to earn a profit on the supply of electricity, on tramways, and other things that might be mentioned, in the smaller-sized towns. But whatever the results of the venture may be, the City Fathers do not care to admit that they have made a mistake, and are increasing the rates through the medium of enterprises undertaken for the ostensible purpose of reducing them. There is no way in which the ratepayer can be assured that proper provision for the renewal and depreciation of working plant has been made. The company may be trusted to look after this point in their own interests; but if they neglect it, the loss does not fall upon the consumer. Some of the contracts for public departments—such as street lighting or the supply of power to tramways—can be placed at non-competitive rates, and made the medium for showing a fictitious profit by the simple process of taking money out of one pocket to put into another.

The complaints of unfair action on the part of municipalities that have been made lately, are not without foundation; and it cannot possibly be urged that a policy of this sort tends to the advantage of the consumer. One can understand a reasonable scale of discounts for large, or for special, classes of consumption that offer advantages such as the employment of plant at a period when it would otherwise be lying idle. But the weak ones should not be bolstered up at the expense of the strong; and each class should stand on its own bottom and pay its own way. One should not bear the whole burden of interest on capital, to say nothing of the actual loss incurred in pushing another. Something may be urged on behalf of furnishing day consumption, for example, at a lower rate of profit, on the principle that it is better to earn half a loaf by running the plant at a time when it is not required for other purposes, and consequently would not be earning anything at all. But there is no half-loaf, common sense, or fairness to the consumers in cutting the special rate down to the bare working cost, or even lower. Gas companies who have more than one price have always followed something like a consistent course; and it is very unusual to find the difference between the highest and the lowest rate exceeding 15 per cent. of the former. But in regard to electricity, the price per unit may range from 7d. down to ½d. Regarded in the light of ordinary commercial fairness and equity—in other words, in the interest of the consumer—it is impossible to justify so wide a variation. Are we to assume that the lowest rate represents the bare working cost, and that the customer who pays 7d. per unit pays fourteen times the actual cost? Evidently the maximum price is too much or the minimum price too little.

The disadvantages of free competition in the supply of gas are so well known that a cursory glance at them will be sufficient. Under their incentive, it is assumed not only that the working expenses would be energetically kept down to the lowest possible point, but that the profits will be cut to the lowest rate at which capital can be obtained. With these points in view, there were some towns, already well served by one gas company, where it was thought to be a wise policy to start a second or opposition venture. If for no other reason, the first must not be allowed to have its own way. It rarely happened that the requirements of the district—such as the actual necessity for two concerns, or whether there was really room for both to make a living—were considered. Very often one of the reasons for promoting the second was an exaggerated idea as to the profit, or the possibilities of profit, enjoyed by the first; and while the probability is that, as a matter of fact, only a small dividend is earned, rumours as to bonuses and other snug little arrangements easily get into circulation, and the popular idea of the profits made by a public company is an altogether erroneous one. There are many people to-day who base their views on the practices in other trades that have some advantage in the way of monopoly, and who firmly believe that the actual profit received by the shareholders on their investments is anything from 20 to 50 per cent., and that statements as to 5 or 6 per cent. dividend are simply a blind.

Some support was given to the supposed advantages of free competition, if the new-comer based its charges on an estimate in which the items of renewal or depreciation were absent or very inadequately represented, or if the two parties concerned could be dragged into a war of prices, with the view of starving each other out. For a time the consumer obtained his supply at cost price, or substantially less; but it inevitably happened that he or his descendants had to pay heavily for the accommodation. The contestants, finding it an unprofitable business to maul each other for the advantage of the public, came to friendly terms, such as an amalgamation or else a districting arrangement. Whatever the details of the bargain, the result was the same—competition was replaced by a regulated monopoly, and the district, while in no way better off than when it was supplied by one undertaking, was saddled with the expense of supporting two. The arrangement was in no way to the interest of the consumer, who was made to bear a permanent debt incurred to meet the expenses of competition. The incubus may be reduced to unnoticeable proportions by the extension and the growth of the business; but it is still there, and hinders a reduction in price.

Examples might be quoted of neighbouring undertakings, one saddled with the results of long periods of competition, while the other has enjoyed an unclouded existence. Comparisons as to the capital per 1000 cubic feet of gas sold or the selling price will substantiate this argument; and it is not so evident in large districts that can well afford to support two or more separate undertakings as in small districts that cannot do so. But the fact is not to be ignored that two separate and distinct works, each with a full staff and establishment expenses, cannot be run so cheaply or so conveniently as in a single undertaking large enough to deal with the whole. Competition also carried other troubles, such as friction in connection with the opening of the roads, and inconvenience to the public by unnecessary frequency of such operations. Without following the whole story, the end may be stated. About fifty years ago, the idea of free competition in gas had already become a thing of the past, and displaced by regulated monopoly. This was the first step towards the cheap and efficient service enjoyed by the public to-day. Investors who would not risk their capital, even at 10 per cent. interest, in a business exposed to free competition, are willing to do so at 5 per cent. under the security afforded by statutory powers.

The competition to which allusion has been made represented competition not only in the supply of gas, but of light. The second gas company, at that time, was the only available weapon. But whether the new-comer is gas, electricity, or anything else, the result is the same so far as the disadvantages of competition are concerned. There is the same duplication of costs in running independent sets of plant, two sets of establishment expenses, two separate staffs, and an increase in the proportion of idle plant, to say nothing of special expenses in the way of advertising, canvassing, and so forth. There is the same public inconvenience following the frequent breaking-up of the roads and footpaths. Neither party expects to lose money as a permanent thing, but to recoup any temporary loss with interest. Therefore all extra charges eventually find their way to the consumer, in the form of an extra loading on the selling price. In the case of competition between gas and electricity, nothing in the way of a districting arrangement is practicable; but amalgamation on terms that are advantageous to both, but not to the consumer, is quite within the bounds of feasibility. Perhaps there is some advantage in the consumer being able to pay his money and take his choice; but it is one that must be paid for. If a regulated monopoly, with its advantages of cheap capital and limitations as to quality and selling price, was necessary and desirable when one agent only was available, it is equally so when two or more distinct systems are at command.

Visit of Juniors to Burnley.—The sixth annual joint meeting of the Manchester and District Junior Gas Association and the Yorkshire Junior Gas Association will take place next Saturday afternoon, when the members will visit the Burnley Gas-Works, and inspect the installation of vertical retorts recently erected by the Engineer, Mr. J. P. Leather.

THE "AUTOMATON" LAMP-LIGHTER.

In selecting a system of automatic street lamp lighting and extinguishing, several questions must be considered besides the mere operation of lighting and extinguishing at stated intervals. There is, for example, the temporary lighting and extinguishing necessitated by abnormal meteorological conditions; and where pressure operated devices are applied, there must be considered the transient extreme rises of pressure necessitated by large draughts upon the mains—such as during the cooking for the Sunday dinner. It is because some of the automatic systems of lighting and extinguishing street-lamps are unable to negotiate emergencies and casual requirements, that there has been failure. A system which contains novel features, and which, in the improved form, is able to readily meet fortuitous circumstances, is that known as the "Automaton" lamp-lighter, which is being exploited by a recently formed Company under the title of the Auto-Lighter, Ltd., of 17, Victoria Street, S.W. The first notice of this new device was published in the "Journal" for Nov. 3, 1908; but since then there have been developments by Mr. George Robson, the inventor, which extend, in a notable degree, the applicability of the arrangement, and, indeed, render it serviceable under all conceivable conditions, merely by the adjustment of the mechanism by the aid of weights and the incorporation of a suitable cam.

But the principle of the invention remains unchanged; the improvements are in directions that enlarge its range and adaptability, as will be shown in the course of the present article. The "Automaton" lighter and extinguisher is a mechanical appliance, with its cycle of actions ingeniously produced by a wave of gas pressure, without any constant running of the mechanism, but simply a few seconds' operation at the time of lighting-up and extinguishing the burner; so that a long life, with little in the way of wear and tear, may be anticipated. The device took our fancy at the outset; and now that it has been brought to a condition in which it can meet the pressure variations of a gas-works supply without occasioning any trouble in lighting-up and extinguishing at times inconsistent with the natural order of things, it invites, and obtains, our good opinion still more. The mechanism is partly in the form of clockwork, with several additions embodied specially for the designed purpose. The whole, as it were, forms a sort of motor, which is energized by a spring, and works only when turning on or off the specially devised gas-cock. Simple as the mechanism really is, it would be impossible to give an intelligible description of it without sketches, or without the actual mechanism before the reader. The mechanism, in its drum-shaped casing, is affixed to the gas-supply pipe and the gas-cock in any convenient position, and without the operating parts being exposed in any way to the current of gas. On the inner side of the flat plate of the casing to which attachment is made, there is a weight-controlled diaphragm, which is inflated when the necessary wave of pressure is sent along the mains. When inflated, it presses against a trigger plate, which sets in operation the mechanism, consisting of a train of wheels, a pawl to start the mechanism, levers, weighted arms, locking lever, and so forth—the weighted arms playing an important part in the adjustment of the arrangement to meet the varying conditions of pressure. No useful purpose will be served by describing the minutiæ of the operations; suffice it that in an hour's experimental work (at Mr. Robson's office, at 59-61, New Oxford Street) with various samples of the device, using a small pressure raising and lowering plant, there was not a single hitch in any of the motions and in the fulfilment of objects. The pilot alight, the gas-cock was turned on when the desired pressure was given, the gas was ignited, the pilot light shut off (when the plug of the cock was turned through 90°); and when the pressure was reduced to the requisite and fixed degree, the reverse results ensued—the main supply being gradually shut off, the pilot light re-ignited, and the mechanism was once more safely locked, but always in readiness for the operations to be repeated at any time. To describe the operations would be to give an idea of complication; while, as a matter of fact, they are demonstrably extremely simple.

In the operation of some forms of pressure apparatus, there are a bell, the mechanism, weights, and valves; and to lift the bell and operate the mechanism for lighting-up purposes, of course a certain amount of pressure (*plus* something for friction) is required. Then the pressure has to be reduced to a certain point to allow of the bell to fall and the mechanism to again become engaged. The pressure required between the lift and the drop is what is called the range; and, within this range, it is stated, there is the seat of trouble. The pressure required in the operation of the mechanism includes a part, as already intimated, to overcome friction; but, owing to vibration, part of the allowance for friction is neutralized, with the result that, supposing the pressure at which the apparatus is set for lighting-up is 40-10ths, it is possible (with vibration happening) there may be lighting-up at 35-10ths. Another disadvantage is said to have been found through local disturbances of pressure due to abnormal draughts which has allowed the pressure to drop to such an extent that some of the street lights are extinguished while others are kept going. In the perfecting of the "Automaton" apparatus defects and inconveniences of the kind have been kept in view, and protection against them provided. In the present form, friction is reduced to a negligible quantity—in fact, Mr. Robson asserts that there is no friction whatever in the apparatus, so that it cannot be affected by vibration; and consequently lighting-up takes place at a definite point and at no other, owing to the means of adjustment provided by the two sets of weights forming part of the mechanism. And no accidental variation of the pressure will affect it. This is highly important. We will not go through the experiments and the results witnessed to prove the point. There was abundant satisfaction that they confirmed the claim; as they also did that the mechanism, simply by the application of additional weights or their removal, enables the range of pressure at which the apparatus works to be varied at will.

Then there is the condition of temporary high pressures—such as during the cooking period on Sunday—to provide for. A gas manager does not want to have his street lamps alight while people are returning from church on the Sunday morning. The "Automaton" lighter obviates any such contingency—in fact, any ordinary movements of pressure up or down will not affect it. Assuming, too, that before the proper time for lighting up, a big demand for gas arises privately through some fortuitous circumstance, and the pressure has to be raised, the lamps will not be lighted before the proper time. Variations of level in a district cause differences of gas pressure. These, too, have been provided for in the apparatus. And the ability to meet any likely variations of pressure in this way without affecting the apparatus is largely due to the ingenious series of beautifully designed cams that Mr. Robson has worked out. We know, in fact, of no ordinary variation in pressure conditions that this device cannot be made proof against, so far as affecting its positive working is concerned.

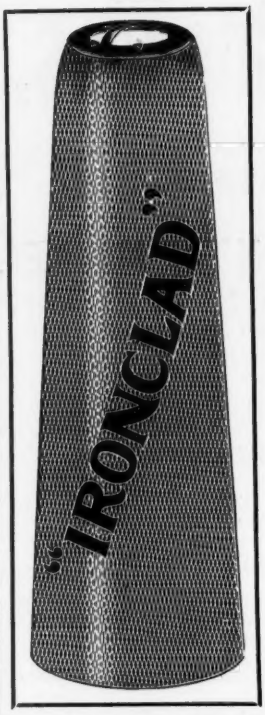
We have purposely avoided giving details here, because, having stated observed facts, it is believed that those who are interested in an apparatus that has been designed to present such a pressure range in the matter of control will be anxious to put it to trial, and on their own behalf investigate causes and merits.

The lighter we understand is being well received by gas undertakings in England and several Continental countries. Among other places, the apparatus has been experimentally fitted to the lamps in the Kenley district of Croydon, and has been in use for the past six or seven months, giving, it is believed, entire satisfaction.

Koppers Bye-Product Coke-Ovens at Birmingham, Alabama.

We learn that 280 Koppers bye-product coke-ovens have been contracted for by the Tennessee Coal, Iron, and Railroad Company for their Birmingham, Alabama, plant. These ovens will be 37 feet long (between doors) and 9 ft. 10⅜ in. high, and will have an average width of 19¾ inches. Each oven will produce 11·25 tons of coke every 24 hours. With coal containing 30 per cent. of volatile matter, the daily output of the plant will be 3145 tons of coke, besides 22 million cubic feet of 500 B.Th.U. gas, 35,000 gallons of tar, and 44 tons of sulphate of ammonia. The ammonia will be recovered from the gas by the Koppers direct process. With this plant of 280 ovens, the United States Steel Corporation will have a total of 1120 Koppers bye-product coke-ovens. The first ovens of this type erected in America were built in 1907 by the Illinois Steel Company at Joliet, Illinois. They have been in operation for nineteen months to date; and they are stated to be giving results superior to any previously obtained anywhere in the world in the bye-product coke-oven industry. This is the same type of bye-product coke-oven that is being erected by H. Koppers for the Lake Superior Iron and Steel Company, at Sault Ste. Marie, Ontario.

THE



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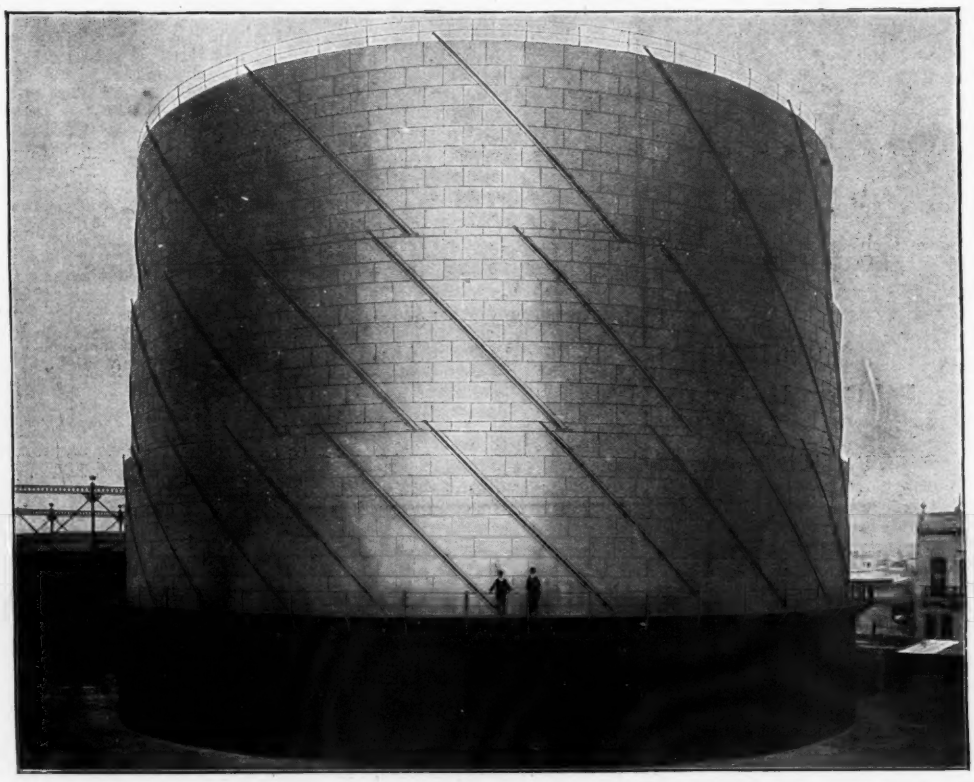

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Palatine No. 0	25	23	36	15¾	27	14¼	14	21
" 1	25	23	37	16¾	28	15¼	15	22
" 2	26¾	24½	38	17¾	29	16¼	16	23
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EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.

Meeting at Great Yarmouth.

The Forty-Third General Meeting of the Association was held at Great Yarmouth last Friday. Naturally such a popular seaside resort has attractions apart from the ordinary inducements of a technical meeting; and the combination of the town and the meeting attractions brought together a large number of members and visitors. The Chairmen and Directors of the Great Yarmouth and the Gorleston and Southtown Gas Companies united in giving the visitors a cordial welcome, which they did by entertaining them at luncheon at Goode's Rooms. At the head of the table was the Chairman of the Yarmouth Gas Company, Sir R. H. Inglis Palgrave, F.R.S.; and he was supported by the Deputy-Chairman of the Company (Mr. T. A. Rising) and another Director (Mr. William Barnard). Unfortunately the Chairman of the Gorleston and Southtown Gas Company (Mr. C. N. Brown) was prevented by an accident from being present; but the directorate was represented by Mr. Z. Rayson, Mr. P. Martin, and Mr. J. Rant. The Mayor (Mr. T. W. Swindell) and the Vicar of Great Yarmouth (the Rev. Canon Willink) were also present. The President of the Association (Mr. John Young) and one of the Vice-Presidents of the Institution of Gas Engineers (Mr. R. G. Shadbolt) were at the upper table. Among the local representatives of the gas industry were Mr. W. J. Carpenter, the Engineer and Manager of the Yarmouth Gas Company, the Superintendent of the Distribution Department (Mr. Charles Ellis), and the Assistant-Secretary (Mr. H. Salter).

After luncheon and the loyal toast,

The CHAIRMAN proposed the toast of "The Eastern Counties Gas Managers' Association," and congratulated the members on having reached their forty-third general meeting. The transactions of the Association showed that it had been a most useful body. It was an old saying that gas dividends were made or lost in the retort-house; and if that were so, then they had much to thank gas engineers for, inasmuch as, in his time, retort-house working had been improved to such an extent that, whereas only 10,000 cubic feet of gas were once made per ton of coal, they now approached 12,000 cubic feet. He was hoping that in time they would be able to excel even this high figure. From the point of view of coal economy, it was interesting to know that so much larger a quantity of gas was being extracted from the coal. In his concluding remarks, he spoke of the value of co-operation in all business matters.

The PRESIDENT, in thanking Sir Inglis and his co-Directors for their welcome, said Mr. Carpenter was evidently blessed with a very fine Board of Directors who took a keen interest in all he was doing, and recognized (as did his professional brethren) the ability with which he managed the concern. It was clear the Chairman of the Company followed intently the trend of events in the gas industry. He thanked him sincerely for his kind remarks regarding the work of the Association. It was quite true that this was the forty-third meeting; but the Association was only 21 years old. Nevertheless, he thought the meeting that day would show those who were not members that it was a lusty band of intelligent and zealous men, who had at heart the true interests of those they served, and possessed the ambition to help forward the good of the community by introducing new processes for improving the products they sold. The Chairman had mentioned the subject of coal, and the application of processes that enabled them to obtain greater results from it. This was of great value; but the price at which coal was supplied was also of immense importance. And they had to face the fact that much was done, and was being done to increase the price. He might instance the Mines (Eight Hours) Bill, which had not met with the smooth working that the late Home Secretary thought it would; and it had caused a great deal of friction and discontent throughout the coalfields. He was afraid it would tend to keep coal permanently at a higher level than it would otherwise have been at. The necessity of cheap gas impressed itself upon every earnest gas engineer at the present time; and it was their intention to hold their own. He was glad to learn of the honour that was about to be conferred on Sir Inglis Palgrave by the presentation to him of the freedom of the town for the services he had rendered to it. He might heartily congratulate the Mayor upon securing such a freeman. [Applause.]

Mr. T. A. RISING (Deputy-Chairman of the Yarmouth Gas Company) proposed "The Visitors." He remarked that there were two Gas Companies supplying the town, though it was not a large one. The Yarmouth Gas Company supplied the east side of the town, and the Gorleston Company the west side. The Chairman of the latter Company unfortunately could not be present, through an accident. The Companies had to meet the competition of the municipal electric light undertaking; but that it was friendly competition was evidenced by the presence of the Mayor and Corporation officials at the luncheon. The competitors were doing their best to outshine each other; and he thought that gas might at present claim the best of it.

The MAYOR, in responding, said it was a great pleasure to him to be present that day. It was indeed very kind of the Gas Companies to invite the head of a municipal body who were running the electric light in competition. It showed that there was a kindly feeling between the Corporation and the Gas Companies. He was especially glad to be present with their distinguished townsman, Sir Inglis Palgrave, in the chair. It was said by some that a man was too old at forty. Sir Inglis had gone far beyond the ordinary span allotted to man; and was hale, hearty, and well, and could make a magnificent speech. He hoped that their Chairman would live long to shed lustre on the town he loved, and which admired him so well. He (the Mayor) regretted the Chairman of the Southtown Company could not be present.

Mr. R. G. SHADBOLT then submitted "The Great Yarmouth and Gorleston and Southtown Gas Companies." He remarked that it had been the privilege of the members to be the guests of many gas authorities during the existence of the Association; but they had never been honoured before by being entertained by two hosts at one time, as they were being that day. As to the Gas Company, the members were intimately acquainted with their methods of working, and with the success attending their operations, through the excellent paper that was read at their meeting a year ago, by their friend Mr. Carpenter; and through that gentleman unbosoming himself as he did on that occasion, the members felt they knew every inch and every bit of plant that formed the works. Having these facts before them, they could not do less than express their admiration and appreciation of the work that was being done in the town by the Company, in the interests not only of the shareholders, but of the consumers. No gas company could expect to be very long successful unless it was an inseparable part of the town in which it existed, and which it served. He thought he might venture to congratulate Sir Inglis Palgrave upon the honour that was about to be conferred upon him by his fellow townsmen in making him a freeman of the borough; and he (Mr. Shadbolt) thought he could say that they, as representing the gas industry, shared, through Sir Inglis, in the honour. [Applause.]

The toast having been heartily honoured,

The CHAIRMAN briefly replied. In the course of his remarks, he said he had noticed that Mr. Young in his presidential address had said that he took £30,000 a year from his slot meters in Hull. He (the Chairman) hoped that in Yarmouth, they too would reach if not something as grand, at least something as respectable.

The Business Meeting.

The Business Meeting was held at the Royal Assembly Rooms—the PRESIDENT (Mr. John Young) in the chair.

The HON. SECRETARY (Mr. Thos. A. Guyatt, of Ely) read the minutes of the last meeting, held at Hull on Sept. 23; and on the motion of Mr. E. W. SMITH (Chelmsford), seconded by Mr. F. L. WIMHURST (Cambridge), they were confirmed.

NEW MEMBERS.

On the proposition of Mr. W. D. CHILD (Romford), seconded by Mr. H. N. CLARK (London), the following gentlemen were elected members of the Association: Mr. George Crick, of Southwold; Mr. Joshua Parker, of Huntingdon; Mr. Charles W. Offord, of Enfield; and Mr. W. H. Thrale, of Hessle. Mr. Albert Cliff, of Stamford, was elected an associate member.

PAPERS AND DISCUSSIONS.

Short introductory papers for discussion were then read by Mr. F. PRENTICE, of Ipswich, and Mr. F. L. WIMHURST, of Cambridge. They were respectively on the subjects of "Purification" and "Free Maintenance." With reports of the discussions, they appear on pp. 310 and 312.

Messrs. Prentice and Wimhurst were subsequently thanked for their contributions, on the motion of Mr. W. B. FARQUHAR (Ilford), seconded by Mr. F. PATERNOSTER (Felixstowe).

Acknowledgment of the vote having been made, the members proceeded to the

ELECTION OF OFFICE-BEARERS.

The PRESIDENT proposed that Mr. J. W. Auchterlonie should be elected President for the ensuing year. The abilities of their friend, he said, were well known to all the members, as was also the admirable way in which he had managed the Gas Company that he served at Cambridge. Mr. Auchterlonie took a keen interest in every subject that was for the good of the gas industry generally, as well as for the benefit of the members of the Association particularly. His geniality and social qualities were likewise valued by each one.

Mr. J. H. TROUGHTON (Newmarket) seconded the motion, which was heartily carried.

Mr. AUCHTERLONIE, in his reply, said he was sure it would require considerable effort on his part to maintain the high standard that had been set by the Past-Presidents of the Association, and not least by the out-going President, Mr. Young. He could promise the members that, if they visited Cambridge in the autumn, they would be received in the best possible way.

Mr. R. G. SHADBOLT (Grantham) proposed that Mr. Paternoster be elected Vice-President of the Association. He thought that young members such as Mr. Paternoster, who were showing keen interest in the Association and in the work of the industry generally, ought to be encouraged. This was the view of the Committee; and he thought that in this case the proposition was a mark of merit.

Mr. JOHN BARTON (Peterborough), in seconding, remarked that Mr. Paternoster would make a useful Vice-President, just as he had proved himself a useful member of the Association.

The motion was cordially agreed to.

Mr. PATERNOSTER, in his acknowledgment, said as it was the wish of the members that he should occupy the position, it would be his hope that the interests of the Association would not suffer during his term of office.

Mr. H. WIMHURST (Sleaford) moved the re-election of Mr. Guyatt as Hon. Secretary and Treasurer. As a former occupant of the position, he (Mr. Wimhurst) knew the vast amount of work

Mr. Guyatt put into the duties of the office; and they were much indebted to him for agreeing to accept the position for another year.

Mr. F. PRENTICE (Ipswich), in seconding, said as a member of the Committee he had had a larger insight than he had had before as to the amount of work Mr. Guyatt had to do; and, having had this, he thought their best thanks were due to him for his acceptance of the office.

The motion was heartily adopted.

Moved by Mr. THOMAS GLOVER (Norwich), and seconded by Mr. W. ORME (Woodbridge), Messrs. H. Wimhurst and T. Dann were re-appointed Auditors.

Mr. W. J. CARPENTER proposed, and Mr. H. N. CLARK seconded, the appointment of Mr. J. T. Jolliffe (Ipswich) and Mr. J. H. Brearley (Longwood) as members of the Committee.

PLACE OF NEXT MEETING.

Mr. AUCHTERLONIE moved that the next meeting he held at Cambridge. He was sure his Directors would offer the members a very hearty welcome.

Mr. C. F. RUGGLES (Leighton Buzzard) seconded the motion, which was heartily carried.

A VOTE OF THANKS—THE INSTITUTION BENEVOLENT FUND.

Mr. GEORGE HELPS (Nuneaton) proposed a hearty vote of thanks to the President and the officers for their services during the past year.

Mr. JAMES TERRACE (Grimsby) seconded the motion, which was unanimously carried.

The PRESIDENT expressed the gratitude of himself and the officers of the Association for this acknowledgment of their services. Proceeding, he said he had a letter from Mr. J. W. Helps the other day with reference to the Benevolent Fund of the Institution of Gas Engineers, which was in an unsatisfactory condition—that was to say, the Committee who administered the fund had not sufficient at their command to meet the demands that were made upon them. Out of nearly 900 members of the Institution of Gas Engineers, there were less than 200 subscribers to the fund. This ought not to be; and it should be regarded as a great privilege by members to assist a little in this excellent cause. What was wanted was regularity of subscription of such amount as members could spare for the purpose, so that the Committee might have an income upon which they could rely. Surely it was the duty of gas engineers to see that those who administered the fund had enough money to meet the demands. He should be glad to receive the names of members who would assist by becoming annual contributors.

THE DINNER.

At the dinner in the evening, the President (Mr. John Young) presided. Unfortunately the venerable Chairman of the Great Yarmouth Gas Company could not be present; but the local gas and water interests were well represented, as was also the civic government, by notably his Worship the Mayor. Among the guests was Mr. Charles Hawksley. After the loyal toast, that of "The Gas Industry" was proposed by the Deputy-Mayor (Mr. C. A. Campling); and, in a brilliant speech, Mr. R. A. Shadbolt responded. "The Town and Trade of Great Yarmouth" was submitted by Mr. John Carter, in a speech that called forth encomiums from the Mayor in the course of his reply, in which he also said that, though the Corporation owned the electric undertaking, it was their wish to see the Gas Company continue at a high level of prosperity. "Kindred Associations" was proposed in appropriate terms by Mr. J. T. Jolliffe; and response was made by Mr. George Helps. To Mr. Carter was also entrusted the toast of "The President." One of his remarks that was cordially approved was that Mr. Young exemplified all the best qualities of the men who had made the gas industry the great power that it is. The President, on rising to respond, was received with almost overwhelming enthusiasm. Before concluding his remarks in response, he proposed "The Health of Mr. W. J. Carpenter," to whom he said the great success of the meeting was almost entirely due. Mr. Carpenter, acknowledging the toast, distributed the honour for the success of the meeting among all those who had assisted him, especially naming Mr. Joseph Hawksley. The Mayor asked permission to interpose to say how much Mr. Carpenter was esteemed and valued in the town. "The Honorary Secretary" was the next toast; and it was in the care of Mr. C. F. Ruggles. Mr. Guyatt made suitable reply. Between the speeches were some excellently rendered songs.

VISIT TO THE GREAT YARMOUTH WATER COMPANY'S ORMESBY PUMPING-STATION.

Saturday morning opened brightly; but before the members were timed to fulfil a kindly extended invitation on the part of the Chairman (Sir Inglis Palgrave) and Directors of the Great Yarmouth Water-Works Company, the atmospherical conditions became grey and somewhat cold. The spirits of the members were proof against depressing influences; and it was a most enjoyable seven-mile drive that was made from the Hotel Victoria on Yarmouth front to the Ormesby pumping-station. Here the members were most heartily received by (in the absence of Sir Inglis) the Deputy-Chairman of the Company (Mr. C. S. Orde), other of the Directors, the Consulting Engineer (Mr. C. Hawksley), and the Manager (Mr. Joseph Hawksley). The pumping-station itself is beautiful, and so are all its surroundings. The filter-beds, each with its cascade aërating the water, were inspected. Then the pumping-house had its machinery examined; and the top floor of the building was invaded to view from the windows four picturesque scenes such as give gratification to any eye that is impressed by Nature's noblest work. After roaming among the interest and beauties, a call was made to a large marquee, where, under the genial chairmanship of Mr. Orde, the visitors were entertained at lunch. Among the guests at the top table was the President of the Institution of Gas Engineers (Mr. J. W. Helps), who had unfortunately been prevented by a Board meeting from reaching Great Yarmouth in time for the previous day's meeting and functions. Following the loyal toast, the Chairman proposed "The Visitors," giving one and all a hearty welcome in the name of the Chairman and Directors of the Company. The Mayor, the President of the Eastern Counties Association, and Mr. Helps responded.

Mr. HELPS said it gave him great pleasure to assist in responding to this toast. They had all enjoyed themselves immensely, and had learnt a good deal. If nothing else, they had, or he hoped they had, learnt the one virtue of cleanliness. From what they had seen that day in the beautiful engine-room of the works, they could carry something home which would enable them to do more than they had done in the past in the way of making their works things of greater beauty than they were at present. The Chairman had remarked upon there being something strange in the way in which gas and water were frequently united. Mr. Orde was right there. He (Mr. Helps) did not understand the reason for it any more than their Chairman did. But there was one very characteristic point in this, that often, when they went into such an engine-room as they had been in that day, they saw the names of gentlemen who had spent a great portion of their lives not only in connection with water but in connection with gas. The name of Hawksley was one that was not only revered in connection with water, but with gas. On the engines he also saw the name of Boulton and Watt (this having been retained by the firm's successors); and every gas man knew their association with the birth of gas lighting. He thanked the Yarmouth Water Company most heartily for giving them this opportunity for seeing their beautiful works.

Mr. Charles Hawksley added a few words, in which he referred to the association of his father with the works before his own appointment as Consulting Engineer. Then came the final toast—Mr. Young submitting "The Great Yarmouth Water-Works Company." The acknowledgment that he made of the bounteous entertainment and pleasure given to the members was most cordially endorsed. Mr. Orde made a genial reply. Shortly afterwards, by the side of one of the filter-beds, a photograph of the visitors was taken; and after further roaming round the station, they remounted the conveyances, and enjoyed the drive back to Yarmouth, where several remained over Sunday.

The following is a description of the Yarmouth Water-Works taken from a booklet distributed among the visitors:

In the year 1850 an inquiry into the sanitary state of Great Yarmouth was conducted by the General Board of Health; and the Superintending Inspector reported upon the utter want of pure water in the borough, and on its paramount necessity and easy acquisition at the Ormesby Broad.

In 1853, the Great Yarmouth Water-Works Company was formed under an Act of Parliament, and authorized to obtain water from Ormesby Broad, situate in the parish of Ormesby St. Michael, about 7½ miles north-west from Great Yarmouth. This broad is one of a chain of shallow lakes, covering an area of about 450 acres, fed from a gathering ground of 10,000 acres, and from springs within their own basins, having an overflow into the River Bure controlled by sluices. The limits of supply comprised the parishes of Ormesby and Caister, with the Borough of Great Yarmouth, including Gorleston and Southtown, containing, according to the then census returns, a population of 28,315. The capital authorized under this first Act was £50,000.

The original works at Ormesby were constructed under the supervision and to the designs of Mr. James G. Lynde. They consisted of a pumping-station, containing two horizontal steam-engines of 30 H.P. each, constructed by Messrs. Cochrane and Co., of Dudley, and two Lancashire boilers. Each engine was capable of pumping 450,000 gallons of water in 24 hours. These engines have been well preserved, and are now used as occasion requires. Two filter-beds were provided, each having a sand area of 20,000 square feet. A 12-inch main was laid to an open reservoir at Caister, and thence to Yarmouth. A stand-pipe was erected at the reservoir to increase the pressure in the town mains. This original Caister Reservoir is now empty. Its use has been discontinued in favour of a newer and larger covered reservoir, containing 1,250,000 gallons, constructed on higher ground, from which a much better service is afforded; the top water line being 80 feet above Ordnance datum.

Shortly after the passing of the Company's Act in 1857, Mr. Lynde resigned his position as Engineer to the Company. Mr. Thomas Hawksley was called in by the Directors to advise; and to his designs and those of Mr. Charles Hawksley, all subsequent works have been constructed.

So far water was only being supplied to the inhabitants on the east side of the River Yare. But great need of water was felt by those living in Southtown and Gorleston; and in 1859 a 10-inch main was laid under the bed of the river to furnish the desired supply. At a later date, 1875, another main, 15 inches diameter, was laid in a similar manner to increase the supply to the western side of the river, and to furnish water for a covered reservoir,

which was built on the highest available ground at Gorleston in 1873. The capacity of this reservoir is 800,000 gallons.

In 1864, Mr. John Ayris was appointed Manager, and held the appointment until his resignation in 1900—a period of 36 years, during which he maintained the works in a high state of efficiency.

In 1878, the Directors of the Company decided to filter the water twice before delivering it to the district. This change involved a large capital outlay in the purchase of additional lands and the construction of another primary filter, of the same design and size as the existing ones, and of two secondary filters, each 150 feet by 100 feet, having a combined area of 30,000 square feet. The work was completed in 1881; and from that date all water delivered to the town has passed through two series of filters.

To meet the increasing demand for water, additional filters have from time to time been made; and the total area of sand used for filtration is now 165,000 square feet.

Before passing on to the sand, the water is pumped over fountains erected in the centre of each filter; and, falling over a series of circular steps, it is, by being broken up in this way, thoroughly aërated.

The Company, in its anxiety to preserve the character of the water, have within recent years made extensive purchases of land and property in the immediate neighbourhood of the works, in order that they may have control over the sanitation, and have done all in their power to render the Broad water beyond suspicion. Careful monthly examinations of the filtered water, both chemical and bacteriological, are made, and they are always found to be satisfactory.

In 1884-5, it became necessary to provide additional pumping power; and with this object another and larger engine-house was erected and furnished with two beam-engines, and a boiler-house with three Lancashire boilers. The engines, built by James Watt and Co., of Birmingham, are each of 60 H.P., and to each are attached the three pumps necessary for carrying out the system of double filtration—a lake pump to raise water on to the first filters; a transfer pump to lift the once filtered water on to the second series of filters; and a town pump to supply the reservoirs and town. These engines are together able to pump nearly 2½ million gallons to the district in 24 hours. A 24-inch cast-iron conduit, through which the water gravitates, connects the lake pump with the centre of the Broad.

About this period, a second pumping main 15 inches diameter was laid from Ormesby through Caister to Yarmouth; and in 1903-6 a 24-inch main was laid. The Company now possess three pumping mains—viz., 24-inch, 15-inch, and 12-inch—which enable them to maintain a constant and abundant supply, which has never been interrupted.

In order that the Company might maintain a constant and satisfactory pressure of water in the mains supplying the higher parts of Gorleston, where a rapid development of building was taking place, the Company, in 1904, established a high-level supply station in the Gorleston reservoir ground, where pumps driven by gas-engines maintain a column of water in a stand-pipe. This ensures the highest parts of this district being served with ample pressure.

The latest, and perhaps the most interesting, piece of work undertaken by the Directors of the Company has been the construction of a cast-iron tunnel at a considerable depth under the bed of the River Yare, 7 feet in diameter and over 400 feet long, through which two steel pipes have been laid, 21 inches diameter, which are in future to convey the water from the eastern to the western side of the river, and will take the place of the existing 15-inch and 10-inch mains laid in the river bed, which, in the interests of navigation, are to be removed. The time occupied in this work has extended over eighteen months, and a most satisfactory watertight subway has been the result.

In the summer of 1903, at the end of a drought extending over many years, the water in Ormesby Broad fell so low (13 inches below sea level) that it became evident to the Company's advisers that, as an average yearly increase of 10 million gallons was required by the district, an additional source of supply must be found to augment the existing one.

The neighbouring town of Lowestoft was also growing and within measurable distance of requiring more water, and arrangements were suggested by which both water undertakings could share the large cost of procuring and utilizing the same source for supplemental purposes.

This was effected by the passing of an Act of Parliament in 1907, giving power to take water from the River Bure, in the parish of Horning, about nine miles from the Ormesby pumping-station. The commencement of the new works is in early contemplation. Water will be pumped from the River Bure to Ormesby, there stored in sedimentation reservoirs, filtered and pumped, and forwarded to Yarmouth and Gorleston—the Lowestoft Water and Gas Company taking their portion in bulk beyond the Gorleston reservoir at the boundary of the Lowestoft Company's district.

The growth of the Company has been continuous, and has increased largely of late years, as may best be shown by the following statistics:—

Total Quantity of Water Pumped.

Year ended March 25,	1871	109,599,146 gallons
,, ,,	1881	200,974,482 ,,
,, ,,	1891	260,386,560 ,,
,, ,,	1901	406,457,360 ,,
,, ,,	1910	487,045,904 ,,

The highest week's pumping during the year ended March 25, 1910, was in the week ended Aug. 14—viz., 11,520,600 gallons; the lowest week's record in the same year, the week ended April 3—viz., 7,718,920 gallons. The large influx of visitors to Yarmouth during the summer accounts for the unusual variation in the quantity of water required, as shown in the above comparison. The present average daily quantity of water consumed for all purposes is 1,334,372 gallons. The population supplied, estimated on the census of 1901, is 55,101. This number is very largely increased during the summer months, and again during the fishing season. The total number of consumers on the books at March 25 last was 14,975.

	Total Amount of Capital Issued.	Total Revenue from Water-Rents.
1871	£84,560	£5,000
1881	133,300	10,040
1891	197,415	12,604
1901	248,300	16,957
1909	315,950	22,569

A dividend at the rate of 4 per cent. per annum has been regularly paid for the last thirteen years.

MANCHESTER JUNIOR GAS ASSOCIATION.

Another Lecture by Professor Dixon.

There was a fair muster of members of the Manchester and District Junior Gas Association to hear an address delivered at the Victoria University of Manchester, on Saturday afternoon, by Professor Harold B. Dixon, M.A., F.R.S., who took for his subject "The Explosion Wave in Gases." Mr. F. Thorp, President of the Association, was in the chair.

Professor Dixon's lecture was of a discursive character, and really an elaboration of the different points raised in his two previous addresses to members of the Association—namely, the "Chemistry of Flame" and "Some Theories of Combustion in Gases." First of all, he demonstrated the effect of the mixture of air and different gas when fired; pointing out that in each case a certain pressure had to be reached in the combustion to make the mixture detonate, and showing by slides thrown on the screen that, once detonation was set up, it continued at an absolutely uniform velocity, which could be predicted from the known constituents of the mixture. He also gave pourtrayals of the beginning of the explosion wave, its development, and how measured. The Professor having dealt with the rate of explosions in gases, the velocity of a sound wave in the flame of exploded gases, the initiation of the detonation wave and of the wave retonation, the initial phases of the explosion, and given a comparison of the rate of the explosion with that of the sound wave, and the instantaneous pressure produced in the explosion wave, proceeded to illustrate the chief points by lantern slides.

Mr. Carter, in moving a vote of thanks to the Professor for his address, said he was looking forward hopefully to the proposed closer union between the Association and the University—being entirely satisfied that it would materially assist students in gas engineering.

Mr. M'Nichol seconded; observing that the lecture made more clear to him the previous two.

The resolution, having been supported by Mr. Kay, was carried with applause.

Professor Dixon, in responding, hinted that, with a closer association between the University and gas engineers, many of the problems that now confronted them might be solved, and advantage taken of new ideas. Could any one of them tell him, he asked, what was going on in the condenser, or what was going on in the gasholder, which was simpler? Then, again, could any of them say what amount of ether was given off the coal in the first hour of the charge? He only mentioned these to show what might be done in the way of research work.

A visit has been made to the Sheffield United Gaslight Company's experimental furnace room by Professor W. A. Carlyle, Mr. W. H. Merrett, and several other gentlemen of the Royal School of Mines, South Kensington. Mr. Arthur Mead, the Superintendent, explained the uses of the several types of furnaces manufactured by the Richmond Gas Stove and Meter Company, and supplied by the Sheffield Gas Company for industrial and trade purposes. A Richmond high-temperature melting furnace, worked by gas and air blast, and capable of developing heat up to 1600° C., specially interested the visitors.

In connection with the Engineering and Machinery Exhibition organized by the proprietors of the "Engineering Review," which is to be held next autumn in the Manchester City Hall, the announcement is made that, as the large space at disposal has proved unequal to meet the demand made for a complete section devoted to colliery and general mining machinery, it has been decided to deal with the position by holding a special Mining and Colliery Exhibition in the same hall from Oct. 16 to 30, 1911. It is intended to make mining by machinery the predominant feature; and special attention will also be paid to the part now played by electricity in mining operations. Educational matters will be given due prominence.

EASTERN COUNTIES ASSOCIATION PAPERS.

[See p. 307.]

PURIFICATION.

By Mr. F. PRENTICE, of Ipswich.

The purification of gas from impurities is a very extensive subject, yet one of interest to every gas man, and one that we can with profit spend a short time considering.

What is an impurity? Anything in the gas that we do not want, and have no use for. At one time, tar and ammonia were so called; and these valuable bye-products were wasted. At the present time, the only real impurities worth much consideration are naphthalene, carbonic acid, and sulphuretted hydrogen. By some, sulphur compounds are placed in this category; but the overwhelming scientific evidence adduced in recent years forbid me to do so, though I propose saying a word or two on the usual methods adopted for its extraction. I will take this first.

Foul gas contains anything from 20 to 60 or 70 grains per 100 cubic feet. Some of this variation is due to coal, and much to retort temperature. It is an elusive compound, hard to be defined, and difficult to arrest. Sulphide of calcium, produced by sulphiding fresh lime, is the usual means employed for its extraction. Carbonic acid has to be rigidly excluded, or carbonate of lime is formed, and the sulphur compounds are either liberated or unarrested.

This sulphide of calcium is an unstable compound, and has peculiar idiosyncrasies—sometimes mopping-up the sulphur compounds with avidity, and at others as freely liberating them. I have known as much as 90 grains per 100 cubic feet to be given off from one of these purifiers.

Fortunately, the sulphur compound bogey has been exposed of late. The wisest scientists of the time have taken it in hand. It is shorn of its terrors; and most of us, as a consequence, rest in peace.

Naphthalene may be called an impurity, but in a different sense to the others referred to. There is no objection to it, *per se;* but we desire its absence because of its choking effect on all pipes, from a 24-inch holder inlet to a ⅜-inch gas-cock. This thin crystal flake, so fragile as to dissolve in the hand, somehow contrives to build its delicate structure into masses that will resist powerful pressures. At one time naphthalene was a curiosity; and I well remember, 25 years ago, collecting some from an old syphon cover, and showing it round as a beautiful rarity.

The temperature of the retorts has largely to do with its formation; and as we must have our retorts hot, in order to produce the makes required at the present day, we also produce naphthalene. And it brings its troubles with it.

After thousands of experiments, and the designing of many elaborate and costly pieces of apparatus for its extraction, it has been found that the simple process of washing the gas with hot water-gas tar will reduce this impurity to a degree that makes it practically harmless.

I suggest, as the result of many experiments, that a rotary washer, working at a temperature of about 100°, will reduce a gas containing 17 to 20 grains of naphthalene per 100 cubic feet to 4 grains, and this by the use of 0·1 gallon of water-gas tar per 1000 cubic feet of gas.

In dealing with this question, it is well to remember that purification begins directly the gas leaves the retort, and continues more or less through the washers and scrubbers, till those boxes are arrived at that we call purifiers proper. Now the more impurities that can be extracted in the earlier stages the better, as the boxes last longer, and purification becomes less costly.

Just a word about carbonic acid. The foul gas usually contains 800 to 1000 grains per 100 cubic feet. Condensers, washers, and scrubbers take out 160 grains—leaving the remainder to be dealt with. Lime is the material usually used in the boxes; and when in Ipswich we were purifying for carbonic acid, we found that, as an average, a ton of Suffolk lime would extract the carbonic acid from the gas made from 438 tons of coal. This impurity if left in the gas reduces the illuminating power half-a-candle per 1 per cent. of carbonic acid; and the question each one has to settle is, Is the cost of its removal compensated for by the additional quality produced? Or, to put it another way, Is the increased illuminating power worth the cost of its extraction?

Sulphuretted hydrogen lies in a different category to the foregoing, and is a very real impurity. Fortunately, it is one easy to grapple with. Some engineers use lime for its extraction; and this method has its advantages where lime is cheap, because carbonic acid is of necessity also eliminated, and a higher illuminating power results. The only thing to be careful of is to see that the carbonic acid does not get too far forward in the boxes, because lime being more in love with the gas than with sulphuretted hydrogen, it readily embraces it, allowing the sulphuretted hydrogen to go forward and cause trouble.

The more usual method for the extraction of this impurity is by means of oxide of iron. The action is simple; sulphide of iron being formed. On exposure of the material to air, re-oxidation takes places; and free sulphur is deposited in the mass. Now it is obvious that taking out, laying down, revivifying, and replacing the material in the boxes, means money; and many schemes have been propounded for revivifying *in situ*.

Twenty-five years ago, I worked a steam-blast injector for forcing air through the boxes after shutting them off. This was a good idea in theory; but, in practice, when the oxide contained a large percentage of sulphur, fires readily occurred, and sieves were burnt up, even though every care was taken. So this plan was abandoned. Then it was found that the admission of 1½ to 3 per cent. of air at the exhauster considerably lengthened the life of a box; and this was, and is now, almost universally done.

The late Mr. W. A. Valon, of Ramsgate, arguing that only a fifth part of the air so admitted did any good—the nitrogen only diluting the gas—tried pure oxygen in quantities of ½ per cent. I inspected at Ramsgate his apparatus—especially the process for producing the oxygen—and found it very interesting. The cost of the latter was, I believe, the cause of its ultimate abandonment.

Comparatively recently, a plan has been evolved which in our case has been very successful, though the exact cause of its success is somewhat of a mystery. I refer to changing the purifiers in backward rotation. Suppose the order to be 1, 2, 3, 4. When No. 3 shows distinctly, No. 4 is put first—the order then being 4, 1, 2, 3. When No. 2 shows, No. 3 is put first—3, 4, 1, 2. And so on. The last purifier always has a good rest from foul gas, and partially revivifies during this period. When its turn comes to go on first again, it will work vigorously once more.

Take an actual example: A purifier was charged with 100 tons of new oxide on Nov. 21, 1907. Sixteen months later it was taken out for the first time, broken up, turned, and replaced. It contained 48·9 per cent. of sulphur. It then worked again in the same box till Dec. 31, 1909, and then contained 54·9 per cent. of sulphur, and was discarded and sold. During this period it was reversed twelve times, and passed 991,827,000 cubic feet of gas. As three other boxes were being worked all the time, we may divide this quantity of gas by four, which gives 247,956,000 cubic feet as the work done by this box. The tests for sulphuretted hydrogen at the outlet of the boxes at the end of twelve months' work were: No. 1, 278 grains; No. 2, 150; No. 3, 100; No. 4, 50.

Catch boxes are a necessity with this method, as traces of sulphuretted hydrogen at the outlets are always obtainable with the paper test, though the quantity is often too small to be estimated by the ordinary Harcourt's colour test. The presence of water gas makes the "catches" all the more necessary. With pure coal gas, the catch boxes would probably last almost the whole of this period. To reduce the pressure which this method tends to produce, we work these purifiers downwards, insteads of upwards.

Discussion.

Mr. R. G. SHADBOLT (Grantham) said the notes Mr. Prentice had compiled, so concisely and nicely, really made it a simple matter to follow and understand the drift of his arguments. Boiling the paper down—making all allowances, and taking into consideration the different factors that had been raised by him—it all came to the point as to the cheapest way of removing sulphur from gas. Undoubtedly, the backward rotation system was about the best in regard to the ordinary purifiers in use at present. Mr. Prentice said it was essential to have catch-boxes. For the last three years, he (Mr. Shadbolt) had been working with three purifiers on and one off, with no catch-box, and most successfully so. There it was seen how circumstances altered cases. The conclusion he had come to was this, that they could not get above a certain life out of their purifiers. He had two 25-feet purifiers and two 15 ft. by 12 ft., with an annual make of 100 millions. Supposing they had three boxes—two on and one off—it was a little difficult to get them changed quickly enough. They had to take into consideration the area of the purifiers; and there was the time element also to be taken into account. If they had only three boxes, they could only wait until No. 1 was foul to a certain extent; and then it must be turned off. He had found that, when he increased the proportion of air, no greater efficiency was obtained beyond a certain point. He stopped measuring his air years ago. It was found that, as they increased the quantity of air, the added quantity of oxygen was passing the foul box, and was simply added to the total volume of gas; and they got as high as 1·8 per cent. of oxygen on one occasion. Just at that time some one read a paper on this backward rotation method; and they immediately grasped the idea. It came to this, that they had to change much more frequently than he understood Mr. Prentice did—they had to change the small boxes much more quickly than the large ones; and by so doing, they could maintain the gas perfectly free from sulphuretted hydrogen. With regard to costs, for the five years preceding the last three, the labour costs on oxide purification alone was 0·22d. per 1000 cubic feet, as compared with 0·08d. for the backward rotation system. The sulphur content, or non-content, under this system, and under their conditions, was much more constant, because prior to every change, under the old set of conditions, they were approaching a show of sulphur, and it actually ran until they got a real show, before they changed. So that reducing purification to a certain set of conditions, they could practically obtain freedom from sulphuretted hydrogen in the maximum, as well as the minimum, period.

Mr. T. GLOVER (Norwich) said he was glad purification was the subject on this occasion, and that carbonization was having a rest for the time. Purification after carbonization must be the matter of greatest importance to them as manufacturers. During recent years they had made considerable strides towards the very desirable state of things of purification in closed vessels. He meant to say they had not got to purification by caustic ammonia dreamed of by scientists a few years ago; but they had

so improved purification in ordinary vessels, and with oxide of iron, that there was little chance, he was afraid, for either Feld's or the Claus process. It appeared they would be able to do their purification, and make it pay, at such a slight cost that purification would not bulk in their balance-sheets at all. And it was to be done by the method to which Mr. Prentice had drawn attention—that was to say, when a box was filled with fresh material, by putting it first, instead of last, as they were taught to do. Mr. Prentice had not given them the reason; and it was important for them that they should understand it. Why was it the reverse method of working would give so much longer life to the material in the boxes? He believed the explanation was that oxide of iron could not absord sulphuretted hydrogen and oxygen at the same time; and, by putting the foul boxes last, the oxygen came through the clean boxes which were absorbing sulphuretted hydrogen, and on to the foul boxes, which were revivified by it. If fresh material were put in, and the box was placed first, it was rapidly absorbing sulphuretted hydrogen for some time, but it was not absorbing oxygen; the oxygen passed clean through it, and revivified the boxes last in rotation. In working with four boxes, the first box was absorbing sulphuretted hydrogen very rapidly, and No. 4 was absorbing oxygen, and was being prepared for being put first. This was how many engineers were now working, and with very great advantage. Regarding downward purification, he (Mr. Glover) did not claim to be the originator of this, because he thought, if he remembered rightly, that he took the idea from Mr. Hislop, of Paisley. A paper that Mr. Hislop read a few years ago, reminded him (Mr. Glover) of a previous experience; and he then tried it again with great advantage. They got much less back-pressure with downward, than with upward, purification; and there were other important reasons why they should have downward purification. All had doubtless noticed that moisture from fresh boxes of oxide was carried forward by the chemical action—by the heat generated; and it condensed in the lower part of the succeeding box and was drained off. It was a corrosive liquid, which was a great nuisance. By downward purification, the condensation took place on the cover of the boxes, and dropped down into the material, and so kept it in condition. There was another matter that was important. If they got oxide too hot, it lost its power of absorption; and the way, he supposed, to revivify the inert oxide (which was sometimes giving them trouble) was to send forward traces of caustic ammonia from the scrubbers, and it became dehydrated. It was probably known by those present that spent oxide was so treated, by the action of caustic soda or caustic ammonia, after being burnt in the kilns; and they could do this quite well for themselves. If they had an inert oxide, it might be brought back to useful life by passing some traces of caustic ammonia through it, by bye-passing the scrubbers to some extent. It had to be done carefully; and it would then bring the oxide back to life. There were various ways in which reversing could be done; but he was disposed to think with Mr. Shadbolt there was less need of catch-boxes with this process, and by this system of working, than with the old system. They did not require catch-boxes in these days. His coal-gas plant was put down for purification by oxide and lime. They obtained release from the sulphur compounds nuisance; and the purification was now done entirely by oxide of iron. The results were exceedingly good. As to the question of nuisance, to some gas engineers, this was one of great importance. In this matter as in others, they ought to have an ideal, and to make their works as little a public nuisance as possible. They wanted their works to be as smokeless and as smell-less as they could be made. When a box was opened, if no care were taken with regard to the foul gas that it contained, it was liable to be a nuisance. When the cover was lifted, the material was full of foul gas, and that went into the air; and if the works were in the midst of residential property, it was a nuisance. It was a simple matter to connect up the boxes with the inlet of the exhausters, and draw air through the boxes downwards, and thus secure the foul gas; and then when the covers were lifted, there was no nuisance. At Norwich this had been practised for a couple of years. He practically lived over the top of the purifiers; and he knew that when they used to change them they had a distinct nuisance. One could not have a strong smell of this kind without having all the neighbours know what they were doing. They had now, however, made the changing of the purifiers almost an odourless operation. When a box was shut off, all they did was to connect up with the inlet of the exhauster, and draw air through for an hour. Then the plugs on the purifiers were shut down again; and before the men entered next morning, the air was turned on once more for about a quarter of an hour. So that, when the men entered the boxes, they were not working in an atmosphere of foul gas. He would be pleased to show anyone the arrangement. There was nothing very special about it; but it was effective in that way. Working downward also helped to reduce the nuisance, because they had none of the corrosive and strongly smelling liquor running on to the floor and into the drains. It was absorbed by the material. Purification had become quite a pleasure compared with what it used to be; and he was sure they were all glad it was so.

Mr. W. B. Farquhar (Ilford) remarked that Mr. Prentice had referred to an example of new oxide that was put in on Nov. 21, 1907. The first time it was taken out it contained 48·9 per cent. of sulphur. It then worked again to Dec. 31, 1909, and then contained 54·9 per cent. of sulphur. Was that on the dry or wet basis?

Mr. Prentice: Wet basis.

Mr. Shadbolt: You can work up your spent oxide with a far greater percentage of sulphur when using the backward rotation system.

Mr. W. J. Carpenter (Yarmouth) observed that Mr. Prentice asked, "What is an impurity?" And his answer was: "Anything in the gas we do not want, and have no use for." That was right in one sense. But in another sense they had a use even for sulphuretted hydrogen. They used it in a way, because they could collect it; and, having collected it, their oxide was rendered more valuable. He was not quite so sure that they were as safe as formerly when the sulphur compounds were reduced within measurable distance. With regard to smell, they ought to make people's homes as smell-less as possible. In their own practice, they endeavoured to reduce the sulphur compounds within what might be called decent limits. At the time when radiators and stoves were being used largely underneath people's noses, it was very necessary to have the gas as clean as possible. He did not think he could say quite as much as Mr. Prentice regarding the overwhelming scientific evidence on this point. They had noses, and could smell for themselves whether the gas was bad; and they did not want any scientist to tell them that. When he went into a place, he could tell whether his own gas was bad; and he did not want any overwhelming scientific evidence to prove the contrary. [Laughter.] He did not think the paper went far enough. They ought not to consider that the whole of the purification was done in the purifying-house. There were interesting purifying processes previous to sending the gas into the purifier-house. There was a good deal to be said about an efficient means of washing and scrubbing; and there were more efficient means nowadays than there used to be. Mr. Prentice also said that it was an easy matter to get rid of naphthalene, if only the gas was washed with hot water-gas tar. He (Mr. Carpenter) had not hot water-gas tar; and so had to employ other methods of getting rid of the trouble. They had introduced a system for its extraction; and they had also adopted means for sending paraffin gas forward, so that it dropped down at the same temperature. He should like Mr. Prentice to say something more about that, because so many of their members had not the particular means at hand that he mentioned. The paper started elementarily, and ended very scientifically, and that was as it ought to be.

Mr. W. D. Child (Romford) said that, when he designed the works for the Romford Gas Company, he went away from what was the very common practice of a long length of foul main between the retorts and the condensers, and made the connection between them as short as possible—bringing the gas into a vertical tube with a number of discs with fine perforations, so that the hot gas was subjected to a straining effect. Thus the tar was removed by friction before the gas went into the condensers. Some few years ago, the Southern Association were making inquiry into the causes of naphthalene, and its possible prevention; and from the description he gave of what he was doing at the Romford works, they were selected as one of those at which Dr. Colman should make special investigation. As the result, Dr. Colman was convinced that the removal of the tar by friction in this way also removed the naphthalene from the gas. At all events in the twenty years or more that the arrangement had been running, they had had no trouble in the works or the district with naphthalene in any proportion whatever. He was in agreement with Mr. Carpenter in so far that they did not want scientific assistance in degrading the gas sent out to the consumers; but they were glad indeed to have any scientific information which would prevent impurities being in the gas.

The President endorsed Mr. Prentice's observation in regard to washing gas with water-gas tar. For eight years they had been doing this at Hull; and naphthalene in the district was practically unknown. As to the backward rotation system, he agreed with Mr. Shadbolt that the greater the rapidity with which the changes were made, the greater the efficiency of the purification; and Mr. Glover's explanation would appeal to each one as to the reason why purification *in situ* took place more effectually by placing the clean boxes in front. This method had been at work in Hull for some years; and they had arranged the connections so that they could work the stream of gas downwards for part of the time, and upwards for the other part. In this way, they could reverse the flow; and this was a great assistance in purification. He also thought the oxidation of the oxide of iron took place with much greater rapidity in the presence of a little moisture, especially if the moisture was warm. For this reason, they added a little steam to the ingoing gas. The oxide never caked; and they could work it for a long time. He had had purifiers that had been at work for twelve months, and gave no excessive back-pressure. He would earnestly recommend each one of the members to pay particular attention to Mr. Glover's idea of getting the purifiers clean before the men went into them. He had seen Mr. Glover's arrangement for doing this; and it was admirable. The results obtained were excellent, though the method was simple. Nuisance was prevented; and the safety of the men was assured, which was the first consideration they all, he was certain, had at heart.

Mr. C. Banham (Wymondham) remarked that he was in charge of small works; and he was afraid Mr. Prentice's paper did not appeal much to gas managers in his category. He (Mr. Banham) represented a Company that had been using oxide exclusively for twenty years; and the problem he had had to face was the trouble of tar and water in the bottom of the boxes, which caused a great waste of oxide. They put up a greater length of foul main,

thinking this would cure it; but it did not. He then replaced the boards in the scrubber with coke; and this he found a great benefit. Instead of getting the bottom of the boxes wet, they now had them dry. He also found that, if they kept the retorts screwed up after the charges were burnt off, sulphur compounds were formed which went forward with the gas, and were not taken out by the oxide. Then, as Mr. Carpenter had said, they could smell the gas.

Mr. PRENTICE, in reply, said he had been much interested in what Mr. Shadbolt had said. He did not know whether Mr. Shadbolt used water gas. There was undoubtedly a difference on the outlet of their purifiers when using water gas, even though a small percentage—say, 17 per cent. He had known the last purifier to show the effect of the reduction of the water gas distinctly; and the sulphuretted hydrogen would sometimes afterwards go back to the first box. The presence of water gas made a catch-box a necessity. He would like to thank Mr. Glover for his explanation as to how the oxide was revivified *in situ*. Though he should be the last man to suggest that Mr. Glover was not hitting the nail on the head, at the same time he must confess to a slight doubt about it; and certainly, as soon as he returned to Ipswich, he should make a series of tests to prove the matter. Because the fact he had mentioned, that the impurity would sometimes recede to the first box on the reduction of the water gas and perhaps increasing the air up to 3 per cent., rather suggested there was some other factor at work in addition to the one mentioned. Now with regard to Mr. Carpenter, he (Mr. Prentice) imagined that, in spite of the value of the production of sulphuretted hydrogen, they would all be glad to be without it. If this was so, it came under his category of an impurity. Then as to water-gas tar, if Mr. Carpenter had none, he believed he distilled his own tar; and crude naphtha and light oils would answer the purpose equally well, if not better. They had at Ipswich for this purpose used benzol dropped into the mains in small quantities. The use of water-gas tar was first suggested to them by Mr. Glover.

Mr. CARPENTER: Where do you put it in?

Mr. PRENTICE: We drop it into the main after a syphon.

Mr. CARPENTER: You said "hot" water-gas tar.

Mr. PRENTICE said it was kept hot because the gas was passing at 100° Fahr. The water-gas tar was, as a matter of fact, put in cold; but the temperature of the washer-scrubber was kept up as hot as possible. In a short paper like the one he had read, he could not say anything about the means of purification preceding the ordinary processes, nor deal with all the impurities. He did, however, mention that the washers and scrubbers had an important part in reducing these impurities, and making the work lighter for the purifiers proper. As to the use of steam, they had tried steaming the purifiers at Ipswich; but so far as they had gone at present, they had not found any advantage. They were not troubled with pressure. He had only known one purifier to give more than (say) 2 inches of pressure; and, as a rule, the pressure was about ½ inch. The effect of steaming for four consecutive days for half an hour each day was that they got oxide out containing 14 per cent. of water; and it had to be laid down and turned two or three times before the percentage of water was reduced sufficiently to make it fit for sale.

The PRESIDENT: The quantity of steam is almost continuous; and when we empty a purifier that has become spent, the usual percentage of moisture is about 4 per cent.

Mr. J. T. JOLLIFFE (Ipswich): Have you any sensible rise in the temperature?

The PRESIDENT: Yes; that is beneficial. The purification takes place at a moderately high temperature.

Mr. JOLLIFFE: What rise in temperature do you get with the steaming?

The PRESIDENT: About 20°.

FREE MAINTENANCE.

By Mr. F. L. WIMHURST, of Cambridge.

It is somewhat difficult to find a suitable title for the few remarks I have to make; and though it appears on the programme as "Free Maintenance," I wish the members to fully understand that I am not here to-day prepared to advise or recommend free maintenance, but more to recommend free supervision of any and all gas appliances. Also I do not wish to restrict your discussion to supervision and maintenance, but to bring forward any ideas or suggestions you may have to make on present-day and up-to-date business methods of conducting the selling department of a gas undertaking.

All are, I think, agreed that the old methods of "Take it or Leave it" must go, and in its stead must rule the complete satisfaction of the consumer coupled with the best interests of the gas undertaking. This state of affairs has no doubt been brought about by competition, the healthy stimulus of which has been good for all concerned. Our gas managers have met the situation in a bold manner; and the makers of gas-consuming apparatus have not been slow to back them up, with the result that various and improved appliances have been placed on the market for the utilization of gas to the comfort of the consumer.

The different appliances now in vogue are all designed on scientific lines; and the gas manager is able to inform his consumer fairly accurately what results he will, or should, obtain with a given consumption of gas. But, unfortunately, these results are frequently not obtained through various causes—that most frequently met with being lack of knowledge and carelessness on the part of those using the gas; and this is more especially so in incandescent lighting.

With a view to giving the consumer more satisfaction from his incandescent lighting, the Cambridge Gas Company some five years ago inaugurated a system of supervision and maintenance at nominal charges of 3d. per burner per quarter, which included one visit per month. This charge is equal to 1d. per burner per visit. All materials are charged for extra.

We have on our books 283 consumers who have taken advantage of the facility; and for the year ending March last, an average of 3850 burners per quarter have been attended to. We have found that an average of about 43 burners can be attended to per day. When the system was started, this average was as high as 50; but the advent of the inverted burner reduced the number. Our charge of 1d. per burner per visit just pays for the supervision. There is, of course, a profit on all material used in the maintenance.

Our total number of consumers is 10,700, and of these 6460 have the ordinary service—showing that a small percentage only are prepared to avail themselves of our present system of maintenance. A good light and a satisfied consumer are two of the best advertisements it is possible to obtain. If we are to acquire these valuable assets, it appears necessary to either reduce our supervision charges or remove them altogether.

To remove the charge for supervision would, in our case, add 1d. to the price of gas—that is, calculating on 6000 consumers being suitable for supervision, with an average of five burners each. As a set-off against this expenditure, there would be a considerable profit on the goods sold for maintenance.

Referring to the men employed on supervision work, it is necessary that these should be suitably trained, smart, obliging, and of good appearance. But as the occupation does not present prospects for advancement, some difficulty might be experienced in obtaining a sufficient number of youths for the work.

The difficulty of maintaining the efficiency of lighting is shared by cookers and gas-fires—both to a less degree, I admit; and the cooker the least of the three.

When spring-cleaning is over and the summer season of shorter lighting hours is upon us, occupation should be found for the maintenance men supervising cookers, as these are more used in summer than winter. Dirty burners, with their attendant objectionable smell and stiff taps, should be rectified; when required, old and rusty trays should be replaced; and the cookers generally should be put into an efficient state. They will then prove to be an even greater boon to the hard-worked housewife than they are in many cases at present.

On two occasions when cookery demonstrations were taking place in Cambridge, a lady instructor has visited the district for the purpose of instructing the housewife in her own home on the use of the cooker. These visits proved very satisfactory, as numerous minor defects were discovered, reported to the head office and rectified, and many frivolous complaints attributable to lack of knowledge were explained away. A few minutes' conversation and demonstration on the part of the lady instructor did far more good than volumes of literature.

Gas-fires have of late been much improved, and their efficiency increased, so that they may now be recommended to the middle classes as well as the more wealthy. To obtain the best results from them, it is necessary that adjustments should be made in the proportions of air and gas; and the disposition of the fuel over the burner should be carefully done at the periodical cleaning. It is difficult to induce consumers to realize this. They continue to use the fire until it becomes inefficient, and then condemn it because it is a nuisance and emits a smell, or it may develop some other defect which, if attended by a skilled person, might be rectified in a few minutes. If these fires were periodically inspected during the winter months—cleaned out and readjusted—how much more satisfaction would they afford the consumer. Where half-hearted satisfaction exists, there would be found a client who would never tire of eulogizing his bedroom or other gas-fire, with its warmth unaccompanied by dirt and dust.

To supervise the three gas appliances mentioned would require a large staff of suitably trained men or youths; and as they do not at present exist, where are we to turn to obtain them? Technical classes are held to teach men and youths various trades—such as plumbing, engineering, chemistry, &c.; and if the county authorities are able to do this, why then should they not have classes for gas combustion, which would include some elementary light and heat and chemistry of combustion.

I do not know that it is yet realized by all gas managers that a gas undertaking is a business concern. Most have now arrived at this decision, and are endeavouring to run the concern on business principles. But the public, I fear, are not aware of this; and if they do not say so, they certainly think the position held by a statutory monopoly is an envious one. It should be our best endeavour to dispel any and all such thoughts as this from the minds of the public; and this may to a great extent be done by civility and courteousness on the part of the servants of the undertaking, and a desire by all connected with it to give satisfaction to their customers—to do more business with them, and induce them to take more gas.

Meter inspectors, who, by reason of their frequent visits, are well known to the consumer, should be trained to give advice to consumers on general gas matters and make recommendations for

additional apparatus. If the inspector is not trained to do this, then he should certainly be instructed to ask if everything is satisfactory, or can the company do anything to improve the lighting, or shall he request the superintending inspector to call?

Great care should be exercised in selecting a man to fill the post of inspector or foreman of the gas-fitters. He should be capable both practically and theoretically; and be able to give advice in fitting all kinds of apparatus, and estimates for both fixing and the cost of running afterwards.

As the inspector is, in a sense, the salesman of a gas undertaking, he should possess tact, and always be on the look-out for fresh business, and be by no means at all short-tempered. A good all-round inspector is worth his money, and may make all the difference between amity and enmity between the consumer and the undertaking.

Advertisements and gas undertakings have not long known one another; and I think there is still space for developments in this direction. A short and seasonable advertisement in a local paper is I am certain good for all undertakings. It is also a solatium for the Press; and it is quite right that the Press should see the actions of the gas company in a proper light. I believe the lack of advertising on the part of gas companies is in no small measure due to the conservatism of boards of directors. Care is required in wording an advertisement. No attempt should be made to say too much; and what is said should be truthful and about our own goods—not concerning the quality or otherwise of our competitors' article.

Much has been said lately in the Daily Press concerning electric metallic filament lamps and other electric appliances. This should be met with some counter article on either gas lighting or some other form of gas consumption. The cost of this should be met in some co-operative manner. A *pro ratâ* basis appears to be the only equitable method. If co-operative action on the part of a sufficient number of gas undertakings cannot be obtained, then the Commercial Sections might see their way to undertake the work. The articles should be carefully drawn up in a literary style by a man who realizes who he is writing for. Technicalities should be avoided, as the man in the street cannot be expected to bother his mind with candle-hours and calories. The recent successes of the London Companies in obtaining the lighting of important thoroughfares in competition with other forms of lighting should not be allowed to rest where it is, but should be mentioned in all the daily papers, because we all know that what is done in the Metropolis to-day is done in the Provinces to-morrow.

Show-rooms are now a *sine quâ non* of almost every gas undertaking. They are a great convenience to consumers for handing in complaints, orders, and payments. The attendant, either male or female, should be fully alive to business. To keep him up to his work, a bonus might be paid on his sales; and if this is paid monthly or quarterly, it is kept more in notice than if it were taken out yearly. An overstocked show-room window is not at all attractive. In addition, nothing in particular is seen by the public. A few articles well distributed, and frequently changed, are more likely to arrest the attention of those who are probable buyers. The public should be invited to enter the show-room without being expected to buy; and if the attendant is at hand to give information (but his presence not rendered obtrusive), it will go a long way towards inducing prospective customers to walk round and inspect the stock.

Public lighting is generally a lean investment; but it is difficult to estimate its value as an advertisement. A street with a row of bright and clean lights along each side, gives one the impression of cleanliness and safety.

Discussion.

Mr. W. J. Carpenter (Great Yarmouth) desired to say how much he appreciated the excellent way their young member had put the subject of his paper before them. He (Mr. Carpenter) came prepared to deal with what was usually called maintenance; but Mr. Wimhurst had dealt with the maintenance of the whole gas industry. The maintenance of consumers' burners, however, was the most interesting thing he could talk about. They charged 9d. per burner per quarter, providing material; and they had already a good many ledger accounts. He did not know how it was proposed to collect the money by charging so much per burner as they were being maintained. It was very difficult to collect 4d. or 5d. at a time as the case might be; it was, in fact, more difficult to collect such sums than £4 or £5. The collection had to be done very carefully; and he found it a most difficult thing to get in small sums, though they had perhaps 25 people collecting. This was the sort of thing they had to consider. It might no doubt be easily arranged in some places. Where one man saw difficulty in a system, another got through it very well indeed. There was also the risk of pilfering. In regard to maintenance, they did as much as they could under the system of so much per burner per quarter. It was a graduated matter, and sometimes came down, and almost disappeared. They were doing maintenance in a great number of cases at 3d. per burner per quarter; but they were, he believed, charging themselves something for doing it. It was one of the most difficult matters with which they as gas managers had to be deal. A consumer might come along and say: "We will take away this business if you do not do this or that for nothing." They did not tell him they would do it; but they did it all the same.

Mr. J. W. Auchterlonie (Cambridge) remarked that the position of the gas industry was very much like that of the trade of the country generally. Rivals obsessed them in almost every section of their business—especially in gas lighting. There they had a rival which was governed by scientifically trained, keen, and vigorous men. These men cut into the gas business; and it was only by cutting into it, that they could hope to extend their own business. Most gas men had been trying to put their houses in order by remodelling their carbonizing plant, and getting down costs, and so reducing the price of gas to the lowest possible point. They had also been endeavouring to get consumers to part with their flat-flame burners, and to put in the incandescent ones. They had at Cambridge adopted free maintenance, or rather the free supervision scheme which Mr. Wimhurst had touched upon. It was disheartening to find that, when one had put in a good installation, it was, in a short time, neglected; and what was once a fine advertisement, had become quite the contrary. They could not perhaps get the consumer to come on to the maintenance system; and yet possibly he could not clean his burners himself, or he would not. The necessity of supervising incandescent burners had been forcibly brought before him of late. He thought that what had been done as a matter of expediency ought to be done universally and gratuitously. He did not advocate free maintenance; he referred to free supervision. One manager had been bold enough to advocate free maintenance at a cost of something like 2½d. to 7d. per 1000 cubic feet—that was, total maintenance. He (Mr. Auchterlonie) thought that very few of them would be prepared to advocate such a scheme, because such a concession could only be given at the cost of the users of gas for power, cooking, and heating purposes. He did not think such a scheme would be equitable even between lighting consumers, because a careless consumer would necessarily cost more in maintenance than a careful one. The question of sliding-scale companies also came in. Though he did not think they could advocate a free maintenance system for such companies, from figures he had taken out, he calculated that 1d. per 1000 cubic feet would cover the cost of free supervision—that was for labour alone. Where there was a profit charged on the materials, the figure might then be as low as ¾d. Such a concession would be one step towards satisfying their consumers. As to co-operation among gas companies for advertising purposes, this ought to be extended to the supply of lady teachers, canvassers, and demonstrators, whom the co-operating companies might have on application to a central authority. In 1907, Mr. Goodenough, the Chief Inspector of the Gaslight and Coke Company, read a paper at the Dublin meeting of the Institution of Gas Engineers; and it would be remembered that he invited the co-operation of the Institution in the matter of advertising. But he (Mr. Auchterlonie) was not aware that anything had been done in this direction as the result. Only recently he had cut out of a daily paper an advertisement regarding a metallic filament lamp. Reading it, one would think it was simply an article stating that electricity was cheaper than gas, until one got to the end of it, and found it was an advertisement for a metallic filament lamp. They all remembered, too, the articles in the "Daily Mail," "Daily Chronicle," and other papers some time ago. Co-operation among gas companies would combat this kind of thing. Personally he felt the distinct disadvantage of these articles being allowed to go unchallenged; and many other managers did the same. He was in a position to say that his Board, at all events, would be very pleased to join some form of combination for the purpose, either through the Institution of Gas Engineers or through the Commercial Sections. Whatever was done ought to be done in a constitutional manner; and each gas manager ought to bring the matter in a direct form before his board. There was a distinct necessity for co-operation in the work of keeping the gas industry in the front.

Mr. George Helps (Nuneaton) observed that all matters, however complex they might appear to be, generally resolved themselves in simple issues. This question of maintenance, or supervision and maintenance, resolved itself into a very simple matter. Were they to supply gas, or were they to supply light, heat, and power? He did not think there could be any question at all about it. If they looked at it from the commonsense point of view, they would not be questioning the advisability of dealing with the matter in such a way that their process covered all that the consumers required. He supposed that those present knew that there were many houses that were fitted up at the expense of their companies, in which the consumers used gas when the mantle was on, but did not use gas when the mantle happened to be off. As gas suppliers, they wanted them to use the gas. If they gave the consumers free mantles, the cost would be charged in the gas. What did it matter whether they charged for the mantle when it was put on, or whether it was charged for in the gas? Mr. Carpenter had put forward the difficulty of collecting small sums of money where they charged for putting on a mantle, or doing something or other. How much longer they, as members of a big industry, would continue to attempt to get money from the consumers in driblets he did not know. It ought to end quickly. Electricians were setting out to charge for electricity by the house, and not by the burner. They were simply doing it on the rating of the house, and surely gas authorities could set about dealing with their consumers so that they knew what their light or heat was going to cost, without having to keep a secretary or some other person to "tot-up" all the sundries for which they were now called upon to pay. Some of their consumers were pestered by all sorts of traders, who called with mantles

and burners, for which they charged heavily, and which money might just as well be paid in the account for gas.

Mr. R. G. SHADBOLT (Grantham) said with respect to co-operation among gas companies with regard to advertising, he did not think he was giving anything away, or anticipating anything in a way he ought not to do, by saying that, at a recent general meeting of various Commercial Sections, a Committee was specially appointed to go into the question of systematic advertising methods among gas undertakings. In the short space of a week, the Committee would be holding its first meeting; and by the time the Institution met in June, when the joint meeting of the Commercial Sections would be held, it was hoped a step in advance would have been taken. A move was therefore being made; and the expressions of opinion that day would help to show there was general dissatisfaction with their advertising methods, or (as the Americans called it) with their Publicity Department. As to the maintenance question, it was rather a big one; and it resolved itself into how far they were justified in going in for saddling the price of gas with the cost of maintenance of this, that, or the other. Because whatever they might include in the price of gas, they were only credited in the eyes of the public with the selling price of the gas. In one undertaking the selling price of gas included nothing else; meter-rents, stoves, connections, &c., were charged for, and paid for, separately. Another undertaking supplied everything free. Between them a difference of 6d. per 1000 feet might be found. With this difference in the cost of gas, the public did not give any credit to the undertaking for supplying all these things free, although the trend of events was in this direction. It was a question they had to very closely watch, so as not to overload their companies to such an extent as to overstrain them. This was the point as it presented itself to him. Cookers and fires, as well as incandescent burners, were being maintained at the present time. What were they costing now; and what was the additional cost going to be if they went in for free maintenance. Free supervision was not free maintenance, particularly if they were going to charge such a price for materials as to recoup themselves for the labour. Take Grantham, which was a good instance with reference to the maintenance of cookers, because they had absolutely saturated the district with them. They had only eighty consumers who had not a cooker, griller, or boiling-ring. This was about saturation-point; so the figures there ought to be reliable. The Company had out 2300 or so cookers; and these cost them, on an average of years, 2s. 0½d. per cooker, or a tax upon the gas, excluding that consumed in the public lamps, of 0·66d. per 1000 cubic feet. Then taking fires (which did not strike the public as they ought to do), they could not exactly run the cost out at per 1000 cubic feet; but it worked out to about 1s. per fire per annum. Cookers required more attention. Coming to incandescent burners, they had been on the maintenance system for some time. A present inventory showed they had 10,000 incandescent lights, and there were still existing some 8000 flat-flame burners. He did not say these burners were used, except occasionally, and not for important purposes. Out of the 10,000 incandescent burners, they had 2200 on the maintenance system—from 6d. to 4½d., and possibly some of them were of a *minus* quantity. [Laughter.] But taking the actual maintenance, it cost them about £235. If they maintained these all free, it would cost them £1068; and even now, under the present system, they were losing £50 a year in net cost. This was what it came to. They had to make up their minds to the expenditure on the top of the other items; and it came to a shade over 3d. per 1000 cubic feet of gas on the total sales, excluding public lamps. Taking the cost of the maintenance of cookers, fires, and their depreciation, they were putting a tax on gas to the extent of 3·64d.; and if they now added the 3d. already mentioned, it would make 6·64d. So that the plain point was this: Was it policy to double the existing tax on the price of gas? This was an actual, concrete case. Could they afford it? Could they render this service to the public in such a way as to be acceptable, and continue to maintain their reputation for low-priced gas upon which they flattered themselves—in some instances, at any rate.

Mr. W. B. FARQUHAR (Ilford) said that some of the remarks made—particularly those of the last speaker—were on the lines he had been thinking out. They had a certain amount of money to find to run their concerns; and it was a question whether they applied the surplus money to reducing the price of gas or to giving more facilities to the consumers in maintenance. His own Company maintained burners at 7d. each; and this 7d. just covered the cost of materials—the time being actually paid for by the Company. So it would be seen that the Company were in a sense losing considerably by the system. But there was this about the scheme of free maintenance, and charging the consumer only for the material, that though the Company gave the consumer good attention, and only requested him to pay for the mantle or globe, the consumer afterwards would wait to the very last minute before he asked for a burner to be attended to. That was why he thought free inspection with a charge for material would fail, and nothing but full free maintenance would answer. He did not advocate free maintenance by any means; he was only pointing out that where a charge was made including labour and everything, the consumer came more readily, and the company obtained a better advertisement because the consumer obtained a better light. In Ilford they had a very keen municipal electric light department fighting the Gas Company; and, on every hand, they found the advertisement "Electricity is Cheaper than Gas." The Electricity Department sent out circulars advocating that houses should be wired, because gas was unwholesome, and there were bad fumes from its combustion. These things had to be tackled, and in no half-hearted way. It had to be stated that gas was good for its ventilating properties; and that certainly it was cheaper than the electric light. In Ilford, they had not a single public gas-lamp through the electricity concern being in the hands of the local authority. He thought in connection with gas-cookers that a good deal could be done by getting builders to make recesses in the sculleries of houses to take them. Another thing they were trying to do was to get coal kitcheners taken out altogether, and to put gas cookers in their place, so as to ensure their use all the year round. Constant use of the cooker kept it in better condition than intermittent use. He should like the writer of the paper to confirm the figure given as to the number of burners he stated could be maintained per day.

Mr. W. D. CHILD (Romford) observed that Mr. Helps had very rightly suggested that they should sell not gas, but light and heat; and Mr. Shadbolt afterwards supplemented this by showing very clearly what it would cost to do so. At the time, however, that most sliding-scale companies were put under parliamentary control, the price was fixed for them under which they could pay a certain rate of dividend; and they were told that further reductions should give them the right to a certain increase of the standard dividend. If they gave away only a penny per 1000 cubic feet in maintenance, they would be robbing the proprietors of part of their dividend. In his opinion, they should endeavour to sell gas as cheaply as possible, and give the shareholders their dividend, and let maintenance be collected separately from the supply of gas.

Mr. J. H. TROUGHTON (Newmarket) said the paper was a useful one, and brought before them a subject, in a forcible way, to which they could not too often give attention. With regard to advertising, Mr. Shadbolt had mentioned that the matter of co-operation between gas authorities who were members of the Commercial Sections would be dealt with at an early date. The electricians had at the present time a system of co-operative advertising; and it recently came into operation. Edmundson's Electricity Corporation (who had undertakings in several towns) had become members of this co-operative movement, and were using the literature that was produced, and sent all over the kingdom to advocate their light. It was said in this literature that electricity was cheaper than gas; and that the electricity suppliers were prepared to back it up—so far as they could.

Mr. WIMHURST, in reply, agreed with Mr. Carpenter that it was necessary to deal with every individual case on its merits. If it became necessary to maintain certain burners free of charge, there was nothing for it but to do it to retain the custom. The charge of 9d. per burner per quarter appeared rather high; but Mr. Carpenter should know best what he was doing. Probably "what he lost on the swings, he gained on the roundabouts."

Mr. CARPENTER: I said we charged it, Sir. (Laughter.)

Mr. WIMHURST (proceeding) said that as to the training of attendants, perhaps Cambridge was somewhat different to other towns. They had a class of people who must be dealt with very carefully; and they had found that certain youths were not satisfactory; while others gave entire satisfaction. They had to deal with ladies, and the youths had to be trained to somewhat pander to the ladies, and let them have their own way. With regard to collecting the money, the attendants carried the mantles and other things with them; and it was known from the stock that was taken out what money should be brought in. And their books showed what was credit, and what was paid for. Mention had been made of the point of saddling the price of gas with these charges. He called attention in the paper to the fact that free supervision did add 1d. to the price of gas. But the consumer had to pay for it; so that, in the end, it came to the same thing. With regard to electric suppliers charging so much per house, many gas companies would be pleased to take houses on at the same rate that the electricity people were charging in this way. As to men walking from house to house selling mantles, surely if householders would buy from hawkers, they would buy from gas companies. It was very gratifying to hear from Mr. Shadbolt that a Committee had been formed to deal with the question of advertising. Mr. Shadbolt had also referred to the question of saddling the price of gas with a sum of money for maintenance; but it resolved itself into a question as to which way the consumer preferred it—a less price for per 1000 feet of gas with a shabby service, or a higher price for gas with a satisfactory service. With the consumers satisfied, then the gas undertaking would continue to go forward in the lighting business. Mr. Farquhar also spoke of gas being charged at the lowest possible price, and other matters. With the monthly visit which he (Mr. Wimhurst) proposed, it would not be necessary for the consumer to call at the gas office to ask for a mantle or a globe. With a monthly visit, the mantles and burners would, he thought, be maintained in a fairly efficient state. As to electrical competition, when he said "Do not say too much about your competitor's article," he meant do not throw too much mud on the competitor. Their line of action should be to impress people with the idea as to what they themselves were prepared to do. The co-operative system of advertising would look after any caustic articles published in the press, and which asserted that electricity was cheaper than gas. As to recesses in kitchens for cookers, it would be a difficult matter to get the builders of cottage property to make such provision. The number of burners that he (Mr. Wimhurst)

mentioned as being supervised per day was 43. The average was 50 when the system started; but it had fallen since the advent of the inverted burner. Mr. Child had remarked upon the position of proprietors in sliding-scale companies. It was quite true that saddling the price of gas with as much as 6d. per 1000 cubic feet would be robbing the proprietors. The question again was whether they were to saddle the price of gas, give satisfaction with the light, and do more business in the lighting branch, or sell gas at a less price, give less satisfaction with the light, and probably in consequence do less business.

GASHOLDER INLET AND OUTLET PIPES.

The Company carrying on business at Lyons, as constructors of gas-works plant, under the title of MM. Bonnet, Spazin, et Cie., have lately taken out a patent for France for an improved arrangement of gasholder inlet and outlet pipes.

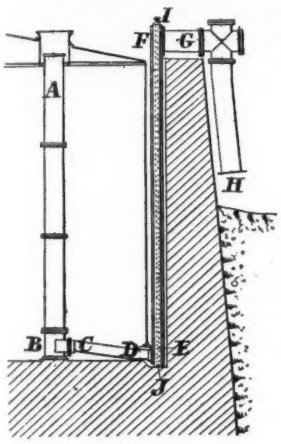


Fig. 1.

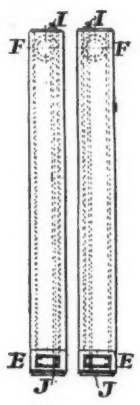


Fig. 3.

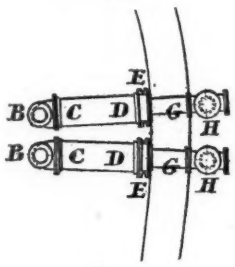


Fig. 2.

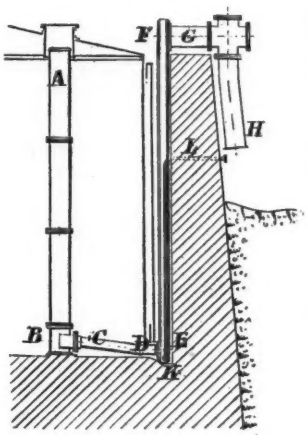


Fig. 4.

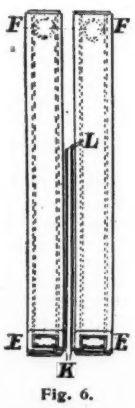


Fig. 6.

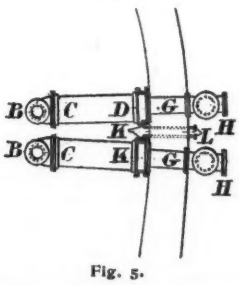


Fig. 5.

The patentees point out at the commencement that the pipes serving to convey the gas into and out of gasholders are placed either inside or outside these vessels. In the latter case, they are so jointed as to ensure, in all positions of the bell, the connection of the pipes rising from the ground in the vicinity of the tank with those fixed in the holder crown. In the former, the pipes run under the foundation of the tank, and end above the level of the water. The outer knee-jointed pipes frequently interfere seriously with the movements of the bell, and wear out the crown sheets; while those laid beneath the masonry of the tank can be neither examined nor repaired. Moreover, when a holder is enlarged by the addition of a second or a third lift, the employment of exterior pipes is out of the question; consequently the diameter of those inside has to be increased. It then becomes necessary to sink a vertical shaft outside the tank, construct a passage under the masonry, and make an opening in the shaft to allow the pipes to pass through. This is always a difficult piece of work, especially if the tank stands on water-logged or rocky soil; for in both cases there is risk of disturbing the masonry and jeopardizing the soundness of the tank. The object of the invention is the removal of these difficulties by an arrangement of fixed inlet and outlet pipes which may be adopted for new holders, but which is specially applicable for those which are to be telescoped, as it does not necessitate the sinking of a shaft.

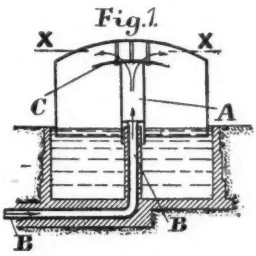
In order to render their explanation of the arrangement as clear as possible, the accompanying illustrations, showing the application of the invention, are given by the patentees. Fig. 1 is a part section of a single-lift holder in a brick tank, the bell descending to the bottom, and resting upon supports; fig. 2 is a plan, in which the bell has been raised; fig. 3 shows the pipes in elevation; and figs. 4, 5, and 6 are variants.

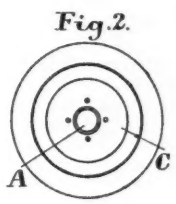
The pipe A B (figs. 1 and 2), fitted inside the tank, and resting upon the bottom, has to be connected to the pipe G H. In order that this may be done, the lower end is prolonged by a right-angled tubulure of the same size as the pipe, and this is attached to the slightly inclined pipe (also right-angled) C D, which is joined to the vertical pipe E F, the lower end of which forms a clearing pocket. The suction-pipe of this pocket I J is placed inside the gas-pipe, if the height of the latter does not exceed 20 to 23 feet. This is the arrangement shown in figs. 1, 2, and 3. If the height is greater than that just mentioned, the suction pipe is placed outside the gas-pipe up to from 20 to 23 feet from the bottom of the tank, as shown at K L in figs. 4 and 6.

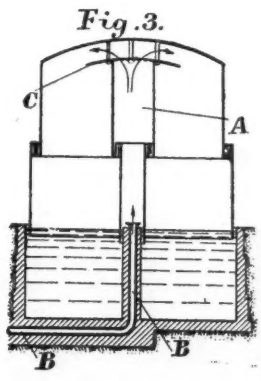
The rectangular form of the pipes lends itself perfectly to the placing of them, whether below the bell at rest, or between the bell and the tank. They can be easily strengthened on the inside. In telescopic holders having two or more lifts, the arrangement described is the same. The inlet and outlet pipes pass below the different lifts, and afterwards between the outer lift and the tank, as shown in figs. 4, 5, and 6.

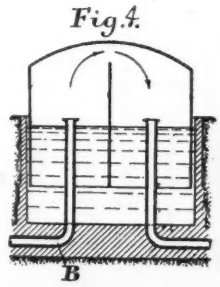
Another French patent relating to the inlet and outlet pipes of gasholders has been taken out by the Ofenbau-Gesellschaft; and their arrangement has for its object to obtain a better admixture of gases than is now possible.

Fig. 1 is a section of a single-lift holder; fig. 2 a section on the line X of fig. 1; fig. 3 a section of a double-lift holder; and fig. 4 shows a method of passing the gas over a central partition.









In figs. 1 and 2, a pipe A, perforated in its upper part, is attached to, and descends from, the crown of the holder; its lower end reaching just below the mouth of the inlet-pipe B, as shown. The pipe A moves up and down with the lift, and consequently the gas is forced always to rise into the crown. With the view of preventing only a partial admixture of the gases, the incoming gas is made to flow over the plate C. For telescopic holders, it is necessary to form the inlet-pipe as in fig. 3.

In the arrangement shown in fig. 4, which is specially suitable for small holders, it will be noticed that the partition does not reach the crown, and that its lower edge is always in the water. It divides the lift into two compartments. The gas conveyed into the holder by the left-hand pipe passes, as indicated by the arrow, into the adjoining compartment, and mixes with the gas contained therein; or the same result may be produced by perforations in the upper portion of the partition. Below the opening there may be placed a plate similar to C in figs. 1 and 3.

COAL TAR FOR ROAD MAKING.

At a Meeting of the Society of Engineers (Incorporated), held at Caxton Hall, Westminster, last night, Mr. R. O. WYNNE-ROBERTS, M.Inst.C.E., read a paper on "Up-to-Date Roads;" and, in the course of it, he dealt as follows with the subject of binders.

There are many bituminous compounds on the market for the purpose of binding together the road-metal, and thus largely reducing the inter-attrition caused by traffic on macadam. The author does not propose to deal with the different commercial binders individually; but as they consist mainly of coal tar, either with or without other ingredients, it will suffice if this commodity alone is dealt with.

Coal tar is one of the most complex mixtures which chemists have had to investigate; and though it has been under examination for upwards of fifty years, new discoveries are continually being made. From the road engineer's point of view, however, this liquid has probably been sufficiently investigated to indicate under what conditions it is best suited for road works. As by far the largest quantity of tar used on roads is obtained directly or indirectly from different gas-works, it is necessary to point out that as the coals, methods of carbonization, and other important factors, differ, so does the quality of the tar vary. Even when the same coal is consumed, it is remarkable how the variation in the quantity of coal charged into each retort, different temperatures, &c., will produce tar of a different character. It is therefore of the utmost importance that road engineers should understand how this product is manufactured before they can apply the same with any reasonable assurance of success.

After giving a succinct description of the process of gas manufacture and the production of the bye-product tar, Mr. Wynne-Roberts proceeded: There are a large number of coking-ovens in operation where the bye-product tar is recovered; and the rapidly increased number of such coking-ovens erected in this country will result in the production of a large quantity of tar. Although there are many points of interest to road engineers in this connection, the author must confine his observations to gas-works tar.

As the temperature of the furnaces and flues is not maintained at the same pyrometric level at all gas-works, the tar must differ. The high heats maintained at the larger gas-works under certain conditions produce tars of great density; while at country gas-works, as the temperature is somewhat lower, this product is less viscous. The practice, which was almost universal until recently, of partially filling the retorts with coal, is now changing into fuller charges; and this has a great influence on the composition of the tar. Furthermore, vertical, "slopers," and chamber retorts are being extensively adopted at the larger gas-works, with the result that the molecular arrangements of the constituents of the tar are altered. In fact, there is every prospect that the tar produced at most of the larger gas-works will soon be altered in composition, by increasing the charges of coal, and by installing other forms of retorts.

Thick, crude tar is not a positive proof of its quality as a binder; for, on the one hand, it is more retentive of moisture, and, on the other, it has in all probability a high percentage of free carbon, neither of which is beneficial to the binding properties of the tar. The separation of the water from tar is not an easy matter. Some of the tars produced in the Metropolis, for instance, are sponge-like in their retentive powers. The question of effective dehydration is an important one to road engineers, because water acts as a deterrent against the efficient adhesion of the tar to macadam, since there is a greater affinity between stone and water than between stone and tar.

It is often found, when boiling crude tar in ordinary kettles, that it is liable to boil over and ignite. As this is almost entirely due to the presence of water, it is important that moisture should be eliminated as far as possible. At some gas-works, the tar is heated by steam-coils, which reduces its viscosity, and causes the water to rise more quickly to the surface to be drained away. All tars should be heated before being applied on the roads. Care must be taken, however, not to raise the temperature of crude tar above 150° Fahr., or it will be liable to froth over. If the above temperature is maintained for about two hours, most of the moisture will be driven off.

As free carbon has no binding value, and is liable to be converted into black dust or mud, it follows that tars containing the smallest percentage will be superior for road work. The selection of tar can only be made by separating the products from different points; that condensed in the hydraulic main being usually the most heavily charged with free carbon. At present, the tars from all parts are drained to one point; and consequently selection is impossible. This, however, will doubtless be changed as road engineers become more acquainted with the virtues and defects of this product.

Tar also contains a considerable quantity of light oil and naphtha, which act like diluents; and unless they are extracted, they volatilize on the road surface, leaving a skin which is not as durable as it might otherwise be. If it happens to rain immediately after the road surface is tarred, the oils are apt to emulsify and be washed into the gutters, and ultimately into the water-courses. Boiling tar in ordinary cauldrons will not drive out the light oil, &c., as it is not possible to raise the temperature sufficiently high without causing it to overflow. These constituents can be extracted only by distillation; and this means the provision of suitable stills, &c. Distillation of tar is a comparatively simple process. The author nearly 25 years ago erected a 3-ton plant, which has been worked by ordinary workmen without any serious mishap.

Having shortly described the process of distilling tar, the author said: Owing to the variability of the quality of crude tar, its use, without prolonged boiling, cannot be recommended; and even then it is not equal in durability and uniformity of results to that obtained by the use of refined or distilled tars. Proprietary tars consist mainly of refined or distilled tars, with the addition of other ingredients. Inasmuch as refined or distilled tar is not obtainable at most gas-works, there is good reason for road engineers to erect either stationary or portable distilling plants, the cost of which will necessarily vary according to their capacities. As the use of tar on roads is of recent development, the number of distilling apparatus installed by local authorities is at present limited; but, with more intimate knowledge, gained by experience, engineers will be able to stipulate the more essential requirements as to the quality of tar. The adoption of such distilling plants will doubtless become more general in the immediate future.

It is possible to design a portable distilling apparatus which can be operated by an intelligent workman, on any convenient point of the roadside, to produce refined or distilled tar of a uniform quality to conform with any workable standard or specification. Such an apparatus would be useful, as effective boiling could be carried on with economy and the minimum of risk, and the tar would be ready for use in the manufacture of tar macadam, tar-sand grout, tar-chip grout, or for tarring road surfaces. The author has designed such a plant.

The most satisfactory methods of testing tar must necessarily be those employed by analytical chemists in their well-equipped laboratories, together with more or less prolonged observations of the effects of climate and traffic. The more essential tests as to the quality of tar are: (1) Specific gravity; (2) viscosity; (3) percentage of free carbon; (4) adhesion; (5) percentage of moisture; (6) loss by evaporation; (7) loss by fractional distillation; (8) percentage of fixed carbon. The usual tests are much too elaborate and tedious for use by road engineers. There are, however, some simple ones which can be employed by them to obtain sufficiently reliable working comparisons; and these are applicable for the first five of the list.

Specific Gravity can be ascertained by means of a Twaddel hydrometer, which, for convenience, should have the degrees and specific gravity figures clearly marked. This instrument, when immersed in the tar, sinks to a depth according to the density of the liquid. Refined tar should have a density of about 50° Tw., or 1·250 sp. gr. To convert Twaddel degrees into specific gravity—let Tw. be the number of degrees Twaddel, then specific gravity = Tw. × 0·005 + 1. For example, 50° Tw. = 50 × 0·005 + 1 = 1·250 specific gravity.

Viscosity.—The hydrometer can be used to ascertain the viscosity of tar. This instrument should be first immersed as far as 50 Tw., or 1·250 sp. gr., and taken out to drain for two or three minutes. Then, with a seconds watch in view, the hydrometer should be allowed to sink into the tar, and the time it takes to subside to the above-mentioned point noted. This should be done two or three times and mean results taken.

Free Carbon.—The same hydrometer can also be used to ascertain with approximate accuracy the percentage of free carbon contained in a tar. Mr. Warnes, an eminent authority on tar distillation in this country, has prepared a formula which is applicable for Midland and probably other tars.

For Twaddel degrees, free carbon = 0·8N − 10.

N = number of degrees.

If specific gravity only is shown on the hydrometer, then

Sp. gr. − 1·000 × 160 − 10 = percentage of free carbon.

The percentage of free carbon in crude tar should not exceed 25.

Adhesion.—No instrument has yet been devised to ascertain satisfactorily the adhesive quality of tar compounds. Tests for ductility are easy and simple; but as the action of the traffic on macadam is that of impact, tending to separate the stones from each other, ductility does not constitute a factor of prime importance. It must, however, be regarded as of some value. The author is investigating the question of a satisfactory test for adhesion, and hopes shortly to bring out an instrument for ascertaining the comparative adhesive qualities of various tars.

Moisture.—There should not be any moisture either in refined or distilled tar; but when crude tar is employed, a simple test for ascertaining if the moisture has been driven out by boiling is that suggested by Dr. Rideal—namely, by placing a cold glass plate over the cauldron. If any steam is being evolved, it will condense on the plate.

There are three methods in which tar is used on road works: (1) Tarring the surface, (2) mixing with macadam, (3) grouting the macadam *in situ*. Each of these has its advocates.

Tarring.—To ensure good results, the road should be dry, not only on the surface, but also for a depth of 2 or 3 inches. A dry, warm surface will facilitate the distribution and absorption of the tar. The road surface should be in good condition, even, and free from pot-holes. Newer surfaces are preferable to older ones, as the interstices are not so closely filled in. Any dust and dirt should be thoroughly swept off the surface, and the joints between the macadam exposed. The tar should be heated to 150° Fahr., and, if crude, boiled for about two hours, and applied hot. If

grit, chippings, or sand is used, it should be frugally spread, and the surplus be removed as soon as possible. The tar should be allowed ample time to soak into the road-surface before applying the sand, &c. It is, however, a debatable question whether any sanding should be done at all, except in the neighbourhood of houses; for this practice tends to retain the tar on the surface, instead of allowing it to percolate into the joints.

Tarring by hand is under better control as to heating, distribution, and percolation than machine spraying, because the area treated is smaller, and more attention can be given to the work by the roadmen. This process is, however, a slow one; and as our climate is somewhat erratic, road engineers desire to avail themselves of short spells of dry weather in tarring as large an area as possible. The distribution of tar under pressure causes the liquid to be atomized, in which condition it must, in the author's opinion, be rapidly reduced in temperature, and thus render the tar more viscous than is desirable.

The advantages of tarring road surfaces are so manifest that they need not here be referred to. There are also certain disadvantages. The surfaces are liable to become slippery; and in the autumn, greasy black mud is produced. Furthermore, when crude tar is used, as already explained, there is danger of polluting watercourses and streams. The economy of tarring roads is generally an appreciable one. Less watering is required, the macadamized surface is more durable, and the public experience greater comfort.

Tar Macadam.—There is a closer affinity between tar and limestone than between it and granite. The former appears to absorb the tar more readily, and to adhere more firmly. Granite, if dry and carefully mixed with tar, will, however, make an excellent road material. Refined, distilled, or prepared tars only should be used for the purpose of tar macadam; and, after mixing, it is advisable to allow the same to mature for several days. The quantity of tar required per cubic yard of macadam will vary, according to the texture and porosity of the stone used.

As slag is used in the manufacture of "tarmac," it might be inferred that, owing to the inherent variability of its quality, due to the different proportions of materials used at iron-works, its durability as a road material would be inferior to natural stone. Doubtless this is the case, in some measure; yet, as a rule, its employment when mixed with tar gives satisfaction. The author has observed that even ordinary cinders mixed with well-boiled crude tar will stand considerable traffic; but the blows caused by the unloading of carts on the pavement resulted in the formation of depressions. When this pavement was taken up, the material was found to be exceedingly tough and difficult to remove. The results of boiling cinders and stone in tar are remarkable; but space will not permit dealing with this matter.

Grouting.—Refined, distilled, or prepared tars mixed with hot, dry sand form an excellent bituminous grouting. The City Engineer of Liverpool has used a similar grout with satisfactory results. In this case, the labour of mixing macadam and tar is obviated. The dry macadam is rolled to an even surface, the grout is poured on the top, and worked into the interstices by brooms and squeegees. The steam-roller is run over the grouted macadam, and the whole fabric consolidated, forming an impervious, durable, and smooth roadway.

Association of Gas and Water Engineers of Austria-Hungary.

The "Zeitschrift" of this Association for the 15th inst. announces that this year's meeting of the Association will be held at Innsbruck from May 26 to 29, under the presidency of Professor A. Friedrich, of Vienna. There will be a reception on the evening of May 26, followed by a concert; and on the following day technical papers will be read and discussed in the morning. In the afternoon, there will be a visit to the Corporation electricity works of Innsbruck, to be followed in the evening by a military concert. On Saturday May 28, the morning will be again devoted to technical papers, and the afternoon to a visit to the Corporation gas-works, to be followed by a short excursion; and in the evening there will be a banquet at the Hotel Tirol. It would have been seen from the translation in last week's "JOURNAL" of a paper by Herr O. Peischer, the Manager of the gas-works, that the carbonizing plant there now consists exclusively of horizontal carbonizing chambers or ovens on the Koppers system. The meeting will conclude with an excursion on the Sunday to Bregenz. The Tyrolese Aeronautical Society have arranged to fill a new balloon of 78,000 cubic feet capacity at the Innsbruck gas-works early on the morning of the Friday or Saturday; so that those attending the meeting may witness the process of filling and the ascent. The meeting has been arranged for the dates named with a view to enabling members attending the meeting of the Association of Bavarian Gas and Water Engineers at Regensburg, on May 22 to 24, to travel direct from the latter place to Innsbruck.

At the annual general meeting of the Institution of Civil Engineers last Tuesday evening, the result of the ballot for the election of officers was declared as follows: President, Mr. Alexander Siemens. Vice-Presidents, Dr. W. C. Unwin, Mr. R. Elliott-Cooper, Mr. Antony G. Lyster, and Mr. Cuthbert A. Brereton. Among the other members of Council, we notice the following: Mr. William B. Bryan, Mr. E. B. Ellington, Mr. Maurice Fitzmaurice, C.M.G., Mr. Walter Hunter, and Mr. Harry E. Jones. The Council take office the first Tuesday in November next.

PARLIAMENTARY INTELLIGENCE.

MIDDLESBROUGH GAS BILL.

Local Legislation Committee.—Wednesday, April 27.

(*Before Sir* FRANCIS LAYLAND-BARRATT, *Chairman, Sir* WILLIAM PRIESTLEY, *Mr.* GOLDSMITH, *Mr.* HELME, *Mr.* FLETCHER, *and Mr.* ROCH.)

This is a Bill promoted by the Middlesbrough Corporation, Part II. of which deals with gas and electricity matters.

Mr. JEEVES, who appeared for the promoters, said they proposed that the illuminating power of the gas should be reduced to 12 candles. When the question of the reduction of the illuminating power was considered by Committees of the House, the practice generally was to make a reduction from 17, 18, 19, or 20 candles to 14 candles. In this case, they were asking for a reduction of 3 candles. From 1868 to 1898, the gas supplied was of 12-candle power; but this was raised to 15 candles. With the now general practice of incandescent lighting, there was no reason why they should not be given power to supply at 12 candles. If this authority were given, it would be in the interests of consumers of gas, because the Corporation would be able to manufacture more cheaply. The supply given would be of 3 per cent. less illuminating power at a considerably cheaper rate. At present, the gas was practically being supplied at cost price; and the policy of the Corporation had been to give a large measure of any benefit there might be in the reduction of the cost of gas to the consumer. For heating, the lower candle power was as effective as the higher one.

Mr. *David Terrace*, the Gas Manager to the Corporation, then gave evidence. He said a great number of houses were occupied by the working classes; and the Corporation wished to extend the prepayment meter system. Tests had been made with 12 and 15 candle power gas with incandescent fittings; and it was found that the former gave 64·66-candle light and the latter 64·2. With 12-candle power gas, they would be able to produce more cheaply than with the present 15-candle power. It was felt that the change would be in the interests of everybody, and that to supply 15-candle power gas was pursuing a course of extravagance. The price charged was 2s. 2d. per 1000 cubic feet for all meters.

Mr. JEEVES admitted that there was no precedent; but the circumstances were peculiar, in so far as they had originally supplied 12-candle power gas.

Mr. *J. Calvert*, a colliery owner, said that it had been proved that they could reduce gas till it had no luminosity in the shape of candle power and still, by an incandescent burner, give a considerable candle power light. Their contention was that reducing the candle power, while it took a little from the light, did not destroy the calorific value of the gas, but, indeed, improved it, because they found in Middlesbrough that when the carburetted water gas mixed with the coal gas there was lack of uniformity in the calorific value. They could not store carburetted water gas in the gasholders mixed uniformly with the coal gas. If the consumers could get uniformity of calorific value, it was better for a gas-cooker and gas-engine than intermittent calorific value; and they thought that if they could reduce the price of gas to the consumer they could, among other things, obtain a largely increased use of gas-stoves in the houses. In Middlesbrough they were peculiarly placed with regard to the Durham coalfield. The Metropolitan supply of gas was made chiefly from Durham coal. The coal that they got in the Metropolis was largely that which was produced in Mid and North Durham. The coal produced in the South Durham district was 1s. a ton nearer to Middlesbrough than the highly bituminous coal that was used in the Metropolis. While the coal from North Durham gave a higher illuminating power and a similar calorific value, that from South Durham gave as good a calorific value, though of slightly less illuminating power. If they had a lower candle standard in Middlesbrough—say, 12 candles—they could employ cheaper coal by 1s. per ton in the carriage alone, and produce, through the use of the incandescent burner, the same luminosity to the consumer, with a more uniform calorific value for power purposes. The Company's annual production of gas was 500 million cubic feet. Against the loss of something less than ½d. per 1000 cubic feet in the light, there would be a saving of 2d. to 3d. in the cost of manufacture. For heating purposes, the consumer would get the benefit of the reduction, with practically no reduction in the heating value of the gas. As the cost was reduced, it was the intention to correspondingly reduce the price charged. The Corporation would have to educate the very poor to the use of the incandescent burner. Through prepayment meters they were supplying 26 cubic feet of gas for a penny.

The Committee decided that, under the special circumstances, they would grant the powers asked for.

Mr. JEEVES, with regard to a clause providing that the consumers of gas should give 48 hours' notice to the Corporation before removing, said it was found that the usual 24 hours' notice was not sufficient in this case, and that 48 hours was not unreasonable.

After a short discussion, the Committee inserted "24" for "48."

Considerable discussion arose upon a new clause which provided that, with regard to the sale of coke from a vehicle in the street, it must be sold in sacks, with a metal label affixed indicating the correct weight therein.

Evidence having been given in support of the clause by the Chief Inspector of Weights and Measures of Middlesbrough,

The CHAIRMAN said he thought a case had been made out.

It was decided that the Board of Trade should be asked for their views upon the matter, and further discussion was postponed.

Thursday, April 28.

On the resumption of the proceedings this morning,

The CHAIRMAN remarked that, on the evidence, they were very much impressed with the necessity to ensure the sale of coke by weight.

Major *MacMahon*, representing the Board of Trade, said that at the time of the passing of the Weights and Measures Act the question of

bringing coke into the same category as coal was thoroughly considered, and it was decided to omit coke from compulsory sale by weight. One reason for this was that the weight of a given volume of coke could be very much altered in making. According to experiments, the difference might be as much as 17 per cent.; while others pronounced it to be 30 per cent. It would not be possible to say by inspection that a particular piece of coke had been damped. It would be a good thing for the Local Authority to make bye-laws and regulations in regard to the sale by weight. If, in order to protect the very poor, it was thought necessary to make it compulsory to sell coke by weight or by measure, the Board were of opinion that it should be made the subject of a General Act and not of a Local Act.

Mr. FITZGERALD said they were only seeking to prevent a particular kind of bad fraud on poor people.

The CHAIRMAN remarked that what the Committee had in mind was that there was a lot of fraud carried on. In Middlesbrough a very large amount of coke was used by the poorer classes. If they had to wait for general legislation, what protection were these poor people to have?

Witness pointed out that if a customer were to ask for a definite weight and the hawker pretended to give that weight, he would come under any particular regulations that the Middlesbrough Corporation might frame. Witness further remarked that it was not unusual to sell coke by measure, because a special 4-bushel measure was created for the gas companies.

Eventually the clause was granted and inserted in the Bill in the following form:

(1) Every person who shall sell or offer for sale coke from any vehicle in any street shall sell the same, or offer the same for sale, in sacks with a metal label affixed to the top of every such sack indicating the correct legal weight or measure of coke therein.

(2) Any purchaser of coke from any vehicle in any street, and any inspector of weights and measures or other officer appointed by the Corporation, may require that any coke sold or offered for sale as aforesaid be weighed or re-weighed, or measured or re-measured, by any instrument or measure stamped by an inspector of weights and measures. Provided

(*a*) No seller of coke, or person in charge of a vehicle in which coke is carried, shall be required under this section to carry coke beyond such distance not exceeding half-a-mile as may be prescribed in that behalf by the Corporation.

(*b*) Where any such coke has at the instance of the purchaser been weighed or re-weighed, or measured or re-measured, in pursuance of the section and found to be of the weight or measure stated in that behalf by the seller of the coke or the person in charge of the vehicle, the purchaser shall be liable to the payment of all reasonable costs actually incurred and incidental to the weighing or re-weighing, measuring or re-measuring.

(*c*) If the owner or any person in charge of any vehicle from which coke is being sold, or offered for sale, in any street wilfully makes any false statement as to the weight or measure of the coke in any sack, or wilfully increases such weight by damping such coke, or wilfully does any other act by which the purchaser of the coke shall be defrauded, or fails to comply with the other provisions of this section, or obstructs any weighing or re-weighing, measuring or re-measuring, authorized by this section, he shall be liable for every such offence to a penalty not exceeding five pounds.

The Bill was ordered to be reported.

RHONDDA DISTRICT COUNCIL BILL.

The Local Legislation Committee of the House of Commons, presided over by Sir FRANCIS LAYLAND-BARRATT, had the above Bill under consideration last week. The only point of interest relating to gas is contained in the following clause:

Notwithstanding anything contained in the Gas-Works Clauses Act, 1871, or any other Act, a person shall not be entitled to demand from the Council a supply, or the continuance of a supply, of gas for premises having a supply of gas or electricity from an installation other than that of the Council, unless he shall have previously agreed to pay the Council such minimum annual sum as will give to them a reasonable return on the capital expenditure and standing charges incurred by them to meet the possible maximum demand for those premises, and the minimum annual sum to be so paid shall be determined, in default of agreement, by arbitration in manner provided by the Arbitration Act, 1889.

Mr. BOYCE, who appeared for the Local Government Board, pointed out that this was an exceptional clause in regard to the supply of gas; but clauses on the subject were allowed by the Local Legislation Committee in the Mountain Ash Bill and the Heywood Corporation Bill of last session. The words "or electricity" were not contained in the Mountain Ash clause, and the provisions allowed in the Heywood case differed materially from those of the clause.

Mr. JOHNSON, representing Messrs. Torr and Co. (the Parliamentary Agents for the Bill), said they would take out the words "or electricity."

The CHAIRMAN remarked that the matter had been thrashed out, and inserted the clause in the Bill.

UNOPPOSED PRIVATE BILLS.

(*Before Mr.* ALFRED EMMOTT, *Chairman, Mr.* WHITLEY, *Mr.* MOON, *Mr.* MOONEY, *and Mr.* VIVIAN.)

The Unopposed Bills Committee of the House of Commons, constituted as above, had before them last week the following Bills.

Bristol Gas Bill.

This is a Bill which proposes to raise additional capital to the amount of £400,000 by the creation and issue of further nominal sums of general capital stock with a dividend limited to 5 per cent. per annum.

Mr. BROWN (on behalf of Messrs. Dyson and Co., the Parliamentary Agents) pointed out that the auction clauses were applied to the issue both of the general capital stock and the new debenture stock. The quality of the gas was to be 14 candles; and the burner to be used was the No. 2 "Metropolitan" argand.

Mr. *John Phillips*, the Secretary of the Company, said the present capital was £1,500,000. Since obtaining their last Act, the expenditure had been about £40,000 per annum.

A good deal of discussion arose upon clause 19 of the Bill, which provides as follows:

Whenever any gas shall escape from any pipe or fitting laid down or set up by, or belonging to, any consumer, and situate between the boundary of his premises and the meter of such premises, or between such meter of the consumer, such consumer shall forthwith, after receiving notice thereof in writing from the Company, prevent such gas from escaping; and in case any consumer shall not within thirty-six hours next after service of such notice effectually prevent the gas from escaping, it shall be lawful for the Company to cut off and discontinue the supply of gas to the premises of such consumer and recover the expenses of such cutting off and discontinuance, together with any moneys due from such customer to the Company, and the costs of such recovery, in the same manner as damages for the recovery of which no special provision is made, are recoverable under the "Gas-Works Clauses Act, 1847."

Mr. BROWN, replying to the CHAIRMAN, said the pipe was the property of the consumer. He paid for it, and, presumably, it was his property. It was not imposing any new obligation on the consumer, occupier, or owner. It simply provided that the consumer was now bound to repair the service-pipe. The pipe was his property; and he must not have it in such a condition as to cause a nuisance to his neighbours. If he did not now do his duty, the Company would cut off his gas.

Mr. MOONEY pointed out that this was going to be an alteration of the general law.

Mr. BROWN contended that it was a more effective remedy for making sure that the general law was given effect to.

Mr. MOONEY: I think if the clause comes in it is going to be a precedent for every other Gas Bill that comes before the House.

The CHAIRMAN said the question was whether the matter was one of such importance that the Committee ought to go out of their way to alter the general law.

Witness said the Company had had about half-a-dozen cases in which there had been escapes; and in some of the cases other consumers had been injured.

Mr. BROWN pointed out that the clause matter was also under the consideration of the Local Government Board; and he thought the Committee might defer their decision until the views of the Board were made known.

The CHAIRMAN said he would not agree to this. This was a year when he did not want to put off Bills to wait for a report.

Ultimately, the Committee decided not to allow the clause.

A discussion also arose upon clause 24, which provides:

In any case in which, in consequence of any default on the part of the occupier of any premises, the Company shall have cut off or discontinued the supply of gas to such premises (whether under the existing powers of the Company or under the powers conferred by this Act), and the occupier so in default shall desire to resume such supply, he shall pay to the Company the expenses of re-connecting the supply, and the Company shall not be under any obligation to supply gas to such occupier until he shall have paid such expenses.

Mr. BROWN, in reply to the CHAIRMAN, said there were many cases where people had refused to pay their gas-rents, and it had become necessary in houses of a substantial character to cut off the supply in order to force the consumer to pay. But having cut it off, they had had to reinstate it and incur other expenses; and they wanted to make it clear that if the consumer desired re-connection he must pay.

The Committee struck out the words "or discontinued," and allowed the clause to stand part of the Bill.

The various other clauses having been adjusted, the Bill was ordered to be reported.

Gowerton Gas Bill.

Mr. BAKER, the Agent for the Bill, very briefly stated its objects. It was proposed to incorporate the Company and dissolve the limited Company who had constructed works and were now giving a supply.

The various amendments, which were of a small nature, having been made, the Bill was ordered to be reported.

Bishop's Stortford, Harlow, and Epping Gas and Electricity Bill.

The portion of this Bill dealing with gas matters was passed at a meeting of the Committee a week ago (*ante*, p. 249); but their decision with regard to the electricity proposals was deferred, in order that they might learn the opinion of the new Bishop's Stortford Council as to the electricity undertaking being in the hands of the Gas Company.

The Clerk to the Council now produced a resolution which the previous Council had passed and one passed at a meeting held recently, which was carried by a majority of one—three members not voting.

The Committee now agreed that the electricity proposals should pass, and ordered the Bill to be reported.

Camberwell Public Lighting.—At the meeting of the Camberwell Borough Council last Wednesday, Mr. William Oxtoby, the Borough Engineer, reported that up to Lady Day the following conversions of street-lamps to inverted burners had been made: Single, 633; twin, 76; triple, 16. The public lamps authorized to be altered, but remaining unconverted, numbered 465; while the number of No. 2 burner lamps not authorized to be converted numbered 3111. In regard to the last-mentioned, the South Metropolitan Gas Company, in submitting their proposals for conversion, stated that experiments were being made with an inverted burner to take the place of the existing No. 2; and pending the satisfactory issue of this experiment, the Council decided to defer consideration of the conversion of that class of burner. The 254 public lamps supplied by the South Suburban Gas Company are not affected by the present conversion scheme.

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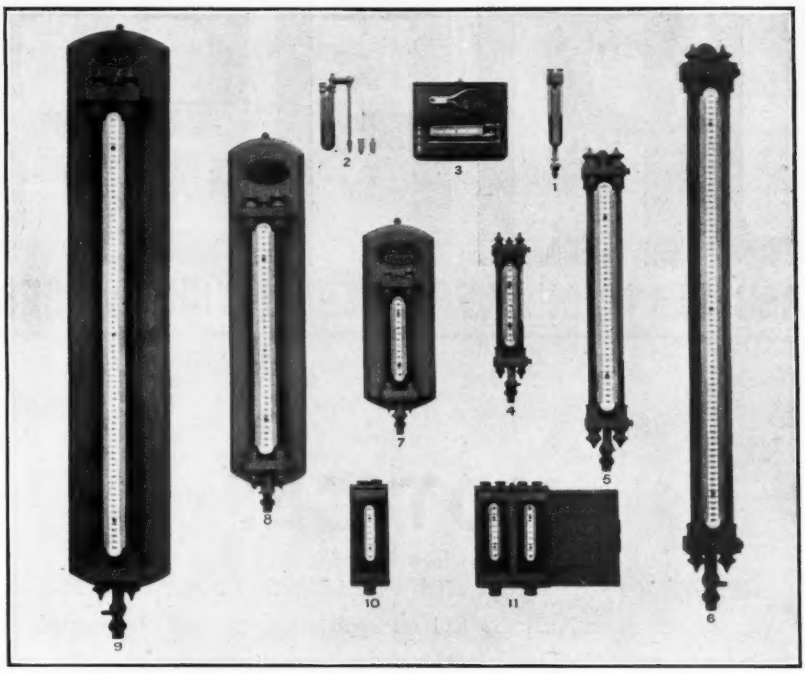

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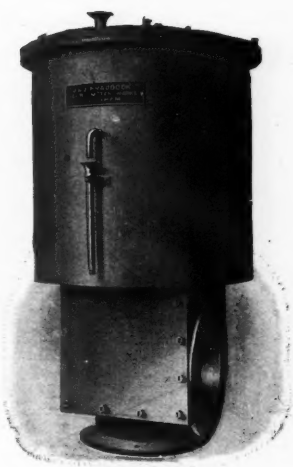

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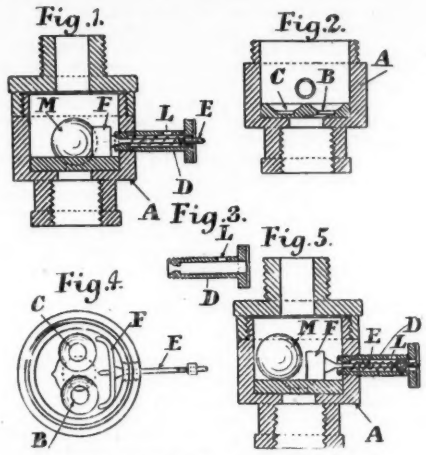
REGISTER OF PATENTS.

Lighting and Extinguishing Gas-Lamps.

GIORGI, A., of Florence, Italy.

No. 7522 ; March 29, 1909.

This invention relates to gas-lamp lighters and extinguishers of the kind referred to in patent No. 27,297 of 1904—a casing adapted to be screwed on to the gas service pipe and to receive the burner fitting ; a ball being struck by the armature of an electro-magnet within the casing so as to close in one position the passage to the burner, and in the other position the passage to an electric igniter. In that arrangement, however, the ball-valve could not be operated from outside the casing. But in the present apparatus, the ball which closes the gas-passage to the burner is designed to be moved from its open or closed position by a striker when force is applied to it outside the apparatus, while at the same time the striker opens a passage for the gas to a lighting device while the pressure on the striker continues.



Giorgi's Lamp Lighter and Extinguisher.

Fig. 1 is a vertical section of the apparatus. Fig. 2 shows more particularly the seats for the ball. Fig. 3 is a sectional view of a tube which forms the passage to the flash lighting device. Fig. 4 is a plan of the casing and striker. Fig. 5 is similar to fig. 1, but shows the ball midway in its travel between the two seats, after being struck.

On the floor of the casing A are two seats B C ; B being in direct communication with the gas supply, while C has no communication whatever—the ball M, of necessity, always resting on one or other of the seats. In the side of the casing is screwed a short tube D, in which works a spring push-rod E carrying a striker F, so formed that it will move the ball from either seat to the other. The inner end of the push-rod forms a valve whereby gas is admitted into the tube D so long as pressure is applied to the push-rod ; the said tube being in communication through the hole L with the flash lighting device. The outer end of the rod E carries a ring or piston, which slides inside the tube and serves to prevent the escape of gas and to compress a spring which tends to keep the valve closed.

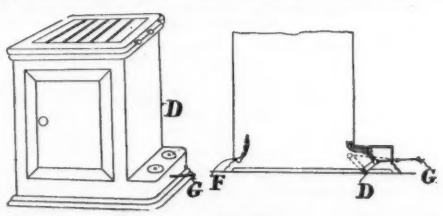
The operation is as follows : Suppose the ball to be closing the passage B to the gas supply, if the push-rod E is struck, the ball will be knocked on to the seat C, and gas will pass to the burner. At the same time, so long as pressure is continued to be applied to the push-rod the gas will pass to the lighting device through the tube D which communicates with it. When it is required to extinguish the light, the striker F is again operated, when the ball will be knocked back on to the seat B communicating with the gas supply.

Gas-Stoves.

CALVERT, G., of Stoke Newington, N.

No. 7710 ; March 31, 1909.

This invention relates to gas-ovens wherein a burner placed within a projection forming part of the oven, performs the dual function of heating the interior of the oven and a portion of the exterior casing projecting from it, and upon which cooking vessels may be placed.



Calvert's Gas-Stove.

The gas-burner within the pocket is so movably mounted as to permit of transference partially or wholly from the interior of the pocket to the interior of the oven, or the reverse, and permits of the heat being directly utilized in the oven when the pocket is not required for the purpose specified.

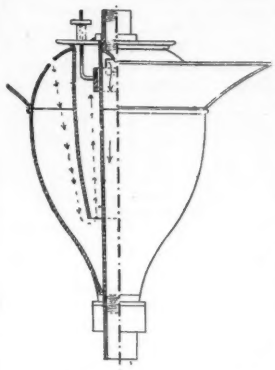
In the arrangement shown, the extension of the oven casing has an atmospheric burner, pivotally mounted at D and with a rod G for moving it. On the opposite side of the oven is the usual fixed burner F.

Inverted Incandescent Gas-Burner.

EDE, E. P., of Highbury, N., and KEMPTON, C. H., of South Lambeth Road, S.W.

No. 7711 ; March 31, 1909.

The gas-nipple and bunsen tube of this inverted burner are enclosed in a cylinder covered by a closed outer shell or casing having primary air holes in its top through which the air passes—"causing it to be superheated by contact with the hot outer casing before mixing with the gas, whereby greater efficiency is obtained, and through the downward and upward course which the air has to travel the back-lighting of the gas is prevented."



Ede and Kempton's Inverted Incandescent Burner.

The burner contains (as shown) an inner cylinder attached to the top of the outer casing by a plate, in the centre of which is a hole, through which the gas supply is carried to the nipple. Attached to the burner is a bunsen tube containing secondary air holes ; the tube passing through the centre of the cylinder and out through an opening at the bottom into the mantle-holder to which it is fixed.

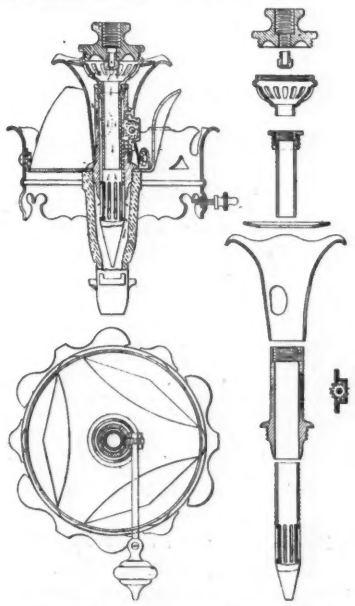
The air to mix with the gas passes through the primary air holes in the top of the outer shell or casing, and travels down the space between the inside wall of the outer shell or casing and the outer wall of the inner cylinder, where, during its progress, it is superheated by contact with the inside of the hot outer shell or casing, and is then sucked up through the open end of the inner cylinder, and drawn into the bunsen tube through the secondary air holes, by the gas, and passes with it down the bunsen tube to the point of combustion.

Inverted Incandescent Gas-Burners.

DARWIN, H., of Birmingham.

No. 12,546; May 27, 1909.

This invention has for its object to provide a construction of burner in which the ordinary air and gas regulators at the upper end of the induction tube are dispensed with, and which is provided with simple and self-contained, but efficient, means for regulating or controlling the proportions of gas and air in the combustible mixture according to requirements, so as to enable the user to adjust or correct the mixture so as to obtain "perfect combustion" and the best possible results with a gas of any particular character or richness, and according to the locality in which the burner is used. The regulator forms part of the burner itself, and is arranged within the mixing-chamber, between the air inlets and the burner-nozzle ; the construction and action being such that as the regulator is opened or closed more or less, so more or less air is automatically drawn into the mixing chamber along with a constant known quantity of gas.



Darwin's Regulating Inverted Burner.

As shown, the burner comprises an induction tube having attached to its upper end an intake chamber (having slits or apertures through which the air necessary for forming the combustible mixture is drawn) screwed on to the gas inlet or nozzle fitting through which a constant known quantity of gas passes. Surrounding the induction tube, but separated from it by an annular space, is a concentric outer sleeve

whose upper end is screwed on to an external collar or enlargement of the induction tube, while its lower end is screwed into the upper end of a mixing and expansion chamber wherein the combustible mixture is formed. The jacket or casing has air apertures surrounding the sleeve and closed at its top by a plate. The incoming air is thus drawn into the jacket through the apertures, and thence passes into the intake chamber.

The regulating device consists of a sliding sleeve arranged within the annular space between the outer sleeve and the induction tube, so as to telescope over and be vertically adjustable upon the latter. The lower end of the regulator sleeve is closed by a tapering needle or conical head which (conforming generally to the contour of the inside of the mixing-chamber) gradually contracts internally towards the nozzle or outlet. Immediately above the conical end the walls of the sleeve are slotted vertically; the slits being arranged to be more or less uncovered by the lower end of the outer sleeve (which acts as a shutter) by the sliding or telescopic action of the regulator. This action is effected by rack-and-pinion mechanism.

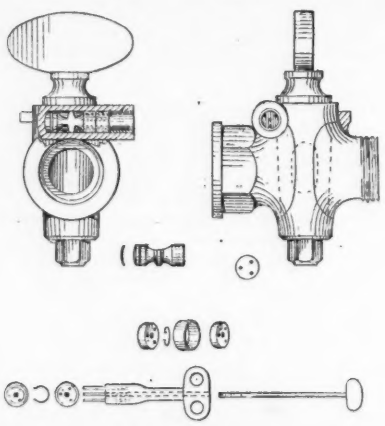
When the slotted regulator sleeve is fully raised, only the extreme lower ends of the slots are uncovered, with the result that only undiluted gas passes through, as its velocity is not sufficient to draw in any air; but by gradually lowering the regulator sleeve by the rack-and-pinion mechanism, the slots are uncovered to a greater extent, whereby the velocity of the known constant quantity of gas passing through it is increased. This causes the correct quantity of air for forming the combustible mixture to be automatically drawn into the mixing-chamber along with the gas; the mixture being formed in the chamber and thence passing to the burner-nozzle. As the regulator is further lowered, so more and more air is automatically taken in—due to the increased velocity of the gas. "The mixture can thus be accurately adjusted by the user to suit the particular richness or character of the gas being used."

Locking Gas or Other Cocks to Prevent their Unauthorized Use.

RALLS, J. C., of Sheffield.

No. 10,358; May 1, 1909.

This invention consists in casting a lug on the plug-box, either projecting at right angles to the diameter of the box or tangentially to its circumference. The lug is bored out and screw-tapped for a portion of its length to take a locking screw plug; but for its whole length, when a central locking flanged plug is used, the remainder of the bore of the lug is left plain. Into the outer end of it is fixed a piece of tube with a space between the screwed part of the lug and the tube to take a loose die to protect the locking plug from being picked.



Ralls' Locking Tap.

The locking screw plug referred to consists (as shown) of a screw working in the tapped part of the lug, and having at its front end a reduced straight or taper locking pin or nozzle. The central locking flanged plug consists of a stationary plug turned and recessed to form a locking flange, a portion of which is cut away for the unlocked position and drilled with holes as in the screw plug and loose protecting die. The back or outer end of the locking plug is drilled with (preferably) three, five, or seven holes to correspond with the number of pin projections on the end of the key. In the plain space between the screw plug and retaining tube, a loose protecting die is introduced, drilled with holes to correspond with the number in the locking plug, through which the key pins pass before finding and entering the holes in the locking plug so as to operate it. The key to operate the locking plugs consists of a bow and stem, the end of which is provided with a number of pins to correspond with the holes in the locking plug.

Obtaining Bye-Products in the Dry-Distillation or Gasification of Fuel.

KOPPERS, H., of Essen-Ruhr, Germany.

No. 19,959; Aug. 31, 1909. Date claimed under International Convention, Sept. 1, 1908.

In the process described in patent No. 20,870 of 1904, a thin saline solution of fixed ammonia is separated with the tar before the gas enters the saturation apparatus, for the production of sulphate. Various methods were indicated for dealing with this solution; one method being to evaporate it, and conduct the vapour to the tar separator, or directly to the saturation apparatus. Another method was the treatment of the solution like ordinary gas liquor, for obtaining ammonia—ordinarily consisting in introducing the liquor into a distilling column, where it is acted on by lime and steam. In patent No. 16,386 of 1905, the patentee also described a process wherein liquor separated by cooling is treated with lime and steam in distillation apparatus, for separating ammonia, which is then superheated and led into a bath.

As set forth in the first of the two earlier specifications mentioned, the treatment in the saturation bath takes place at a temperature sufficiently high to prevent condensation in the bath. It is, therefore, desirable to prevent unnecessary addition of water vapour to the gases before they enter the bath. It is clear, the patentee points out, that addition of water vapour does take place if the vapours generated in the distilling column, by treatment with lime and steam, are led into the saturation bath. Moreover, the precipitated liquor contains a considerable proportion of tarry constituents; and in the process of distillation, the greater part of these tarry bodies accompanies the ammonia. If the tarry constituents of the gas liquor pass with the vapours from the distilling column into the acid bath, they are for the most part separated there, and soil the bath and salt, and are themselves attacked by the acid.

The object of the present invention is to remove these disadvantages; and the invention consists in mixing the vapours from the distilling column with the crude gases which are not yet cooled and freed from tar. All the ammonia is thus led back to the gas without loss, while by the subsequent treatment of the gas current in the cooler and tar separator, the water added in the distilling column is condensed, and the tarry constituents derived from the gas liquor are retained. Pure gas is thus obtained, in which the proportion of water is solely determined by the saturation corresponding to the lowest temperature reached in the cooler. The state of superheating, including the requisite margin of safety, can consequently be obtained at a much lower temperature, so that the chemical conversion in the saturation bath can be effected at about 40° C. For the purpose of obtaining the ammonium salt as neutral as possible, this reduction of temperature is said to be highly important; and the efficiency of the process is increased with regard to the production of tar, since the constituents formerly forming impurities are also obtained—being separated with the bulk of the tar in the tar-separator.

Under certain conditions, it is sufficient to mix the distillation vapours with the gas in front of (or in) the tar-separator, where they are subjected to sufficient cooling.

The improvement described has a further effect: In the case of the hitherto used processes for obtaining sulphate of ammonium, discoloration of the ammonium salt by ferro-cyanide compounds it is known frequently occurs; these compounds being produced by the action of the constituents of the gas on the iron pipes, in the presence of water. In the process set forth in the first invention cited above, the occurrence of such compounds is excluded, inasmuch as, by reason of the superheating, the water is not present in the liquid state. But in the separate treatment of the gas liquor, it is possible that such ferro-cyanide compounds may occur, inasmuch as the vapours from the distilling column are themselves in a saturated, or only slightly superheated, state. Reduced external cooling of the conduit leading these vapours to the saturation bath may cause such compounds to occur; and they may then pass into the bath and discolour the salt. According to the present process, such ferro-cyanide compounds are not introduced into the bath, but are carried away with the precipitate without deteriorating the salt.

Distilling Coal and Recovering Bye-Products.

RICHARDS, R. S., of Wraysbury, and PRINGLE, R. W., of Richmond.

No. 15,643; July 5, 1909. No. 22,290; Sept. 30, 1909.

The complete specification of these combined patents was accepted on March 24 last. It points out that the proposal is to employ, in a form of muffle-furnace (horizontal or inclined), an endless conveyor, consisting of a continuous series of trays attached to chains, forming an endless band, caused to travel slowly by mechanical means. The upper stretch of the conveyor passes through a distilling chamber closely enveloping the band, and enveloped on all sides by heating flues; the arrangement being such that the upper stretch of the conveyor travels slowly through the distilling chamber surrounded by, or sandwiched between, flues, while on the return journey the conveyor does not pass through the distilling chamber—the whole apparatus at the same time being enclosed for the purpose of excluding air. The coal while it is on the conveyor is thus heated efficiently as it travels through the distilling chamber; but the band, on the other hand, is only subjected to the high temperature of the flue while passing through the distilling chamber.

Fig. 1 (p. 321) is a longitudinal section of the apparatus, fig. 2 a cross section, and fig. 3 a section (on a larger scale) through the self-contained retort formed by the distilling chamber and its heating flues.

The upper chamber A of the structure has mounted in it an endless conveyor B, consisting of open-ended and open-topped trays divided into a transverse series of channel-shaped compartments by webs or plates C passing around chain wheels, and the links of which have lateral supporting arms D. The upper stretch of the conveyor passes through to the distilling chamber E, which has rails on which the arms D travel, and the under stretch of the conveyor returns outside the distilling chamber. This latter is enveloped by a heating flue F, which, together with the distilling chamber, forms a separate and independent structure (a self-contained retort) mounted on wheels and capable of being run into and out of the upper chamber upon rails. The ends of the chamber are provided for this purpose with doors or covers G, lined with refractory material. The distilling chamber and heating flue are constructed of boiler plate, and the outer walls of the heating flue are all lined with refractory material. The distilling chamber is heated by producer or other gas burnt in the enveloping flue F and admitted to burners at the far end of the flue.

With this arrangement, the material travelling through the chamber is subjected to a progressively increasing temperature as it proceeds. The waste heating gases pass away from the end of the flue F to a waste-heat main H, and can be utilized for generating steam for the gas-producer from which the burners are supplied, or for any other

Fig.1.

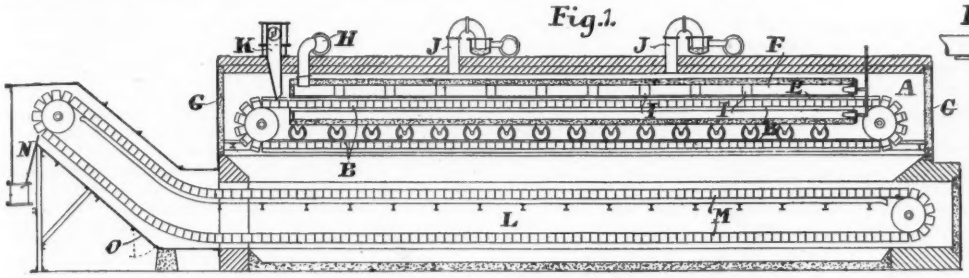
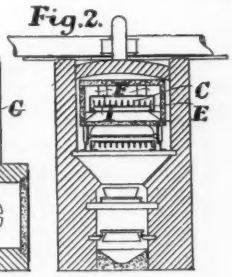
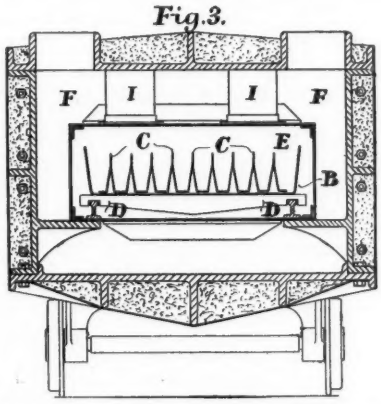


Fig.2.



Richards and Pringle's Coal-Distilling Apparatus.

Fig.3.



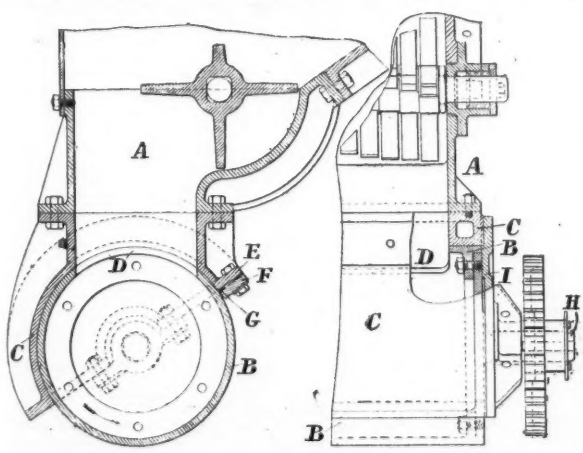
purpose. Pipes I open at intervals into the distilling chamber, and through the top of the enveloping flue F for the escape of the gases and distillation products, which are led away by rising pipes J from the top of the chamber A to hydraulic mains connected to foul mains. The coal is fed continuously to the trays of the conveyor by a hopper K, and the feed is regulated by a revolving drum arranged to prevent the access of air to the chamber A. The coal is supplied to the drum by a screw conveyor or other means. The upper chamber communicates with a lower cooling chamber L by a hopper-like passage the whole length of the upper chamber. M is an endless cooling band formed of open-ended and open-topped trays supported in its travel on rails. The material discharged from the endless conveyor B at the delivery end drops into the trays of this conveyor, which carries it slowly through the cooling chamber and delivers it through a double door discharge outlet N into trucks or otherwise. O is a door for giving access to the cooling conveyor.

Removing the Residue from Gas-Retorts.

WOODALL, H. W., of Bournemouth, and DUCKHAM, A. M'D., of Little Bookham, Surrey.

No. 22,811; Oct. 6, 1909.

A common device for removing the residue from gas-retorts or the like consists (the patentees point out) of a drum revolving in, and closely fitting, a stationary cylindrical casing. The latter has an opening coinciding with the discharge mouth of the retort, or the hopper forming a continuation of the retort; and the revolving drum has a like opening. Then, as the two openings register with each other, the drum receives residue which falls from the retort or hopper and subsequently discharges the residue through a second opening in the casing



Woodall and Duckham's Vertical Retort Discharge Drum.

when it has turned through an angle of 180°. To diminish friction and for other purposes, the casing has been cut down to a segment of a cylinder having only sufficient surface to ensure that the opening in the revolving drum shall never make communication between the interior of the retort and the atmosphere; and this surface has been reduced to a minimum by substituting for the revolutions of the drum an oscillation on the axis of the drum, "for in this case the portion of the segment on one side of the opening in the casing can be very short in cross section, since the opening in the drum never has to pass this portion."

There is considerable difficulty in keeping such a casing gas-tight. Gas escapes not only circumferentially between the surface of the drum and the shorter portion of the casing, but also in directions parallel to the axis of the drum between the surface of the latter and the casing. But this difficulty is to a great extent removed by the present invention, which provides a faced plate in contact with the end of the drum and the end of the segmental casing, both of which ends are suitably faced; there being such a plate at each end of the drum—thereby preventing any longitudinal leakage. In addition, there may be provided a stuffing-box at the longitudinal edge of the shorter portion of the casing to prevent the circumferential leakage, "which is in itself a known device for preventing leakage between a furnace discharging drum and its part casing."

In the illustration—a cross section through the drum and its casing and a part longitudinal section—A is the hopper from which the coke, discharged from the retort by a known device, falls into the drum B. The portion C of the casing on the left hand of the cross section is long enough to prevent the opening D in the drum from making communication between the atmosphere and the hopper; but the portion E on the right hand is much shorter in cross section—the drum only turning in the direction of the arrow sufficiently to discharge the coke, and then returning to the position shown. According to the invention, to the longitudinal flange E of this part of the casing there is bolted a plate F, between which and the flange is an asbestos or other suitable packing G bearing against the surface of the drum. As shown, there is made in one with the bearing of the axle H of the drum, a plate I. the inner faced surface of which abuts against the similarly faced ends of the casing and the drum.

APPLICATIONS FOR LETTERS PATENT.

9314.—DAWSON, A., "Gas cooking-stoves." April 18.

9360.—CHANDLER, D., "Inverted burners." April 18.

9408-9.—DEMPSTER, R., AND SONS, LTD., and BROOKE, R. M., "Gas-retorts." April 19.

9412.—RAE, J., "Incandescent gas-regulator." April 19.

9415.—BETHEL, E., and MAGUIRE, J., "Automatically regulating the supply of gas when used as fuel on boiling apparatus." April 19.

9417.—WILLIAMS, T. J., "Acetylene generators." April 19.

9469.—KEYMER, W., PARSONS, F., and CLYMO, G. H., "Boiler attached in the roof of gas-ovens." April 19.

9494.—WOODALL, H. W., and DUCKHAM, A. M'D., "Heating vertical retorts." April 19.

9559.—HAMILTON, F., and BERINGER, R., "Acetylene generators." April 20.

9630.—HAYES, J. R. S., "Ball and screw-down valves for water or gas." April 20.

9610.—LAKE, H. W., "Gas-producers." A communication from Tait Producer Company. April 20.

9662.—WILLIAMS, H., "Taps or cocks." April 21.

9692.—RICHMOND GAS STOVE AND METER COMPANY, LTD., and THORNTON, H. M., "Gas-cooker plate-racks." April 21.

9729.—WALTON, C., and RAYNER, G. H., "Trough conveyors." April 21.

9770.—LIGHTFOOT, C., "Regulators for acetylene gas." April 21.

9792.—JEFFERY, F. W. J., "Automatic gas-economizer for naked flame burners." April 22.

9808.—WANDBY, H. W., and PORTER, W. H., "Pressure-reducing valves." April 22.

9849.—SPROTT, E. W., "Acetylene generators." April 22.

9915.—HELPS, G., "Lamps." April 23.

9940.—FLETCHER, RUSSELL, AND CO., LTD., and FLETCHER, T. W., "Gas-fired furnaces." April 23.

Blackbirds' Nest in a Retort-House.—Writing on the 25th ult., a correspondent at Coatbridge said: In the retort-house at the Pitlochry (Perthsire) Gas-Works is at present to be seen a pair of blackbirds feeding their young. An iron spike had been driven into the wall, and some pieces of old chain hung on it; and on this the blackbirds built their nest. They take no notice of the men in the retort-house or the work that is going on. This is the fourth season they have taken up their abode in the same place.

Woodhall Spa Gas Scheme.—Last Thursday evening there was a meeting of Woodhall Spa ratepayers, when it was decided by a substantial majority not to ask the Urban District Council to oppose the establishment of a local gas-works by Mr. T. G. Marsh, of Manchester, who undertook to find the capital and supply gas at a maximum charge of 5s. per 1000 cubic feet—the Council having the option of purchasing the concern at a valuation after fifteen years. Several people present expressed the opinion that the Council ought to have the matter in their own hands, and not let private individuals reap the profit. Mr. Hotchkin, who presided, remarked, however, that in this case the already overburdened ratepayers would have to pay the loss entailed on the first two or three years' working.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Local Government Board and their Powers.

An engineering firm well known to many of our readers write under date of the 25th ult., as to the extent of the power which they consider the Local Government Board should possess of vetoing the use of certain materials by municipal engineers. They agree that the Board should have some measure of control and advisory power over the various local authorities; but they express the opinion that this important power, in order to secure the maximum of impartiality and efficiency, should not be in the hands of any single official, who may not be in complete touch with all the modern improvements in plant or who may hold views not in line with those entertained by other engineers of experience and the profession generally.

In this age of speciality and rapid progress, our correspondents continue, what is wanted in such an important department (dealing as it does with engineering works of great magnitude in constant succession) is a committee of gentlemen of knowledge and experience, to whom can be referred questions such as the permissibility of the use of certain materials, and the loan period which should be assigned for works carried out with such materials. This committee should include representatives of the other great spending departments who have much to do with engineering—such as the Admiralty, War Office, Post Office, &c., who naturally have opportunities of ascertaining the reliability and behaviour of different appliances and materials in the course of their experience. In this connection, they call attention to the fact that some of the materials vetoed—or penalized—by the Local Government Board are in extensive use by the other departments.

Nor should even the deliberations and decisions of this committee form a final resource, they contend. In important cases, the matter should be submitted to another and larger committee, composed of gentlemen of eminence in the profession. They suggest that a suitable panel would comprise the Presidents (or an elected member) of the various big Societies—such as, for instance, the Institutions of Civil, Mechanical, and Electrical Engineers, the Gas Institution, the Iron and Steel Institute, &c. This would ensure that matters in regard to which there is any doubt or difference of opinion would be probed into by men of extensive experience and of authority in the engineering world, and prevent any question of arbitrary judgment, pet theory, and unfair restriction arising.

LEGAL INTELLIGENCE.

Kitson Empire Lighting Company, Limited.

Last Tuesday, a petition presented by Messrs. W. M. Still and Sons, Limited, for the winding-up of the above Company, which has been before the Court on several occasions, was again mentioned before Mr. Justice Swinfen Eady. Mr. Maugham said the petitioners were creditors of the Company; and during the adjournment, a resolution had been passed for voluntary winding-up. Under these circumstances, he was instructed to ask that the petition should be dismissed. His Lordship thereupon dismissed the petition, without costs.

A Magistrate on Prepayment Meters.

At the Children's Court at Old Street, presided over by Mr. Cluer, William Bond and Henry Goddard, both 12 years old, were charged with being concerned together in stealing 7s. 4d. from an automatic gas-meter at No. 10, Hilton Street, Commercial Road, the money of the Commercial Gas Company. Bond was further charged with stealing 2s. 7d. from another meter. Mr. Cluer (to Mr. Young, solicitor, who appeared for the Company): You are responsible for three of the charges before me this afternoon by reason of the trumpery locks your Company put on these automatic gas-meters. You place temptation in the way of boys. I have no doubt if I had been in their places, I should have stolen from gas-meters. The temptation is too great. Why do you not put strong locks on these things, or place them high up against the ceiling, so that boys cannot reach them? I have before me a boy, who is on remand, charged with breaking the padlock from a gas-meter with a pair of scissors. Mr. Young: In this case, a hammer was used. Evidence was given that Bond said to a police-officer: "Goddard went indoors and got a hammer, and we knocked off the lock and took out 2s. I had 1s." Both boys pleaded guilty. Mr. Cluer: I cannot send you boys to a reformatory until you are 19, or it will be too long. I cannot send you to an industrial school; for it would be said that your characters would affect the characters of other boys there. I must either discharge you or birch you. Try the effect of six strokes each.

An Unsuccessful Compensation Claim.

At the Oldham County Court last Thursday week, Judge Bradbury, who had the assistance of Dr. Corns as Medical Assessor, heard an application under the Workmen's Compensation Act by Mrs. Hough, of Middleton; the respondents being the Middleton Corporation. Mr. Backhouse appeared for the applicant, on the instructions of the National Union of Gas Workers; the respondents were represented by Mr. Douglas Knocker. The application was for compensation in respect of the death of Thomas Hough, who was employed at the Middleton Corporation Gas-Works. On Nov. 18, 1907, as the deceased man was about to leave his work, and was walking along a plank in the engine-house, he slipped and fell into a pit, in the middle of which was a pipe projecting upwards; and this pipe caught him just below the heart. He proceeded home, and went to his work the next night, and worked all night; but the following day, he was unable to go to work. He was treated by a doctor, and resumed his occupation a few days later. He worked regularly for twelve months, and then was away two days in October, 1908, and five in November. Then he was absent for about a month; and on Jan. 28, 1909, he had to go to the Oldham Infirmary, where he died on June 9. The question was whether death was due to the accident or to natural causes; and on this point evidence was given by Dr. Whitestone, of Middleton, who first attended the man after the injury, and by Dr. Godson, who had charge of him at the Infirmary. The former said that after the accident the man suffered from cardiac asthma, due to dilation of the heart, and death was, if not directly due to the accident, at least accelerated by it. For the respondents, evidence was given by Dr. Henderson (who made a post-mortem examination) that death was due to an aneurism which was of five or six years' standing, and which could not have been caused by the accident. Dr. Alexander M. Sharp, of London, also gave evidence that the accident could not have caused the aneurism. After other evidence, the Judge said Dr. Corns was of opinion that the man had suffered from the aneurism before the accident; and it had simply run its course. Judgment was therefore for the respondents.

Liability for Water-Rate.

Last Tuesday, in the Shoreditch County Court, before his Honour Judge Bray, Emma, Louise, William, and Harry Goodman sued their tenants, Frederick William and Harry Bishop Garnham, of Eldon Street, E.C., tailors, to recover £2 12s. 6d., being two quarters' water-rate paid to the Metropolitan Water Board under compulsion, as the defendants refused to pay. Mr. Battcock, who appeared for the plaintiffs, said the defendants covenanted to pay all outgoing rates; and he submitted that the water-rate must be included. There had been trouble before with the defendants; and they finally paid £7 17s. 8d. But at the March period, they again refused to pay, despite the demand note; and the landlords (plaintiffs) were forced to pay. One of the defendants submitted that he was not liable at all for the water-rate to the landlord, but only to the Water Board, who, however, for reasons best known to themselves, declined to sue. He denied that he had ever had a demand from the Board for fourteen years. He also submitted that he had no water-pipes, apparatus, or water on his premises; and he had been informed by the Board that in consequence they could not sue him. Under these circumstances, as he was liable to the Board, if anybody, the landlord could not sue. Mr. Edmund Woolridge, City Cashier to the Board, said demand notes were always sent; and he could not imagine anyone out of the office saying the defendant could not be sued. They had an agreement with the plaintiffs that the water-rate should be paid by them, as landlords, if the tenants did not do so; but this was only a measure of protection against bad tenants. They could still sue. Judge Bray: It seems clear that if he will not pay the Board, the landlord must. Defendant: But I want the Board to sue me. Why should I pay if I have no water or apparatus? I have a separate assessment. His Honour: And you have to pay 5 per cent. on that. Defendant: But why to my landlord? His Honour: Because you have agreed to. Defendant: And I am to pay for water I do not have? His Honour gave judgment for the amount claimed, and awarded the plaintiffs costs.

A Point in Water-Supply Law.

The Lexden and Winstree Justices were called upon to decide a lengthy legal argument, when George Littlewood was summoned by the Brightlingsea Urban District Council for the non-payment of £2 expenses incurred by the Council in executing certain works on his premises. For the Council, Mr. Prior explained that the case arose out of an action taken by the Council under the Public Health Act of 1875. It was admitted that in consequence of a report made to the Council by their Surveyor, notice was served on defendant to obtain a proper supply of water; that the notice was disregarded; that the Council then did the work; and that their charge was a fair and reasonable one. He understood it was to be contended that, before the Council could recover the expenses incurred, they must satisfy the Bench that the house in question had not a proper water supply before they took action. He knew of no authority for such a proposition. The Act of Parliament and all authorities were diametrically opposed to this contention. The Act said: "Where, on the report of the surveyor of a local authority, it appears that a house is without a proper supply of water, the local authority shall give notice," &c. Mr. Jones, for the defence, said that if the Bench decided they had jurisdiction to go into the question as to whether the house had a proper supply of water before the Council took action, expert evidence would be called at a later date. If they decided they had no such jurisdiction, he would ask them to state a case for the High Court. According to Mr. Prior, the Surveyor was master of the situation. If a person said he did not want the Council's water, he would have to have it, merely on the report of the Surveyor. They were living in England; and yet, according to his friend, this was what the law was. Just think of the autocratic position in which Mr. Prior would put a surveyor, who very often was the cheapest man a Council could get. The premises in question had a perfectly wholesome water supply; and it was mere temper on the part of the Council to try and force the defendant to take their water. After a brief consultation in private, the Bench decided that they had no power to question the authority of the Surveyor; and they made an order for payment, with costs. Mr. Jones submitted that there were authorities diametrically opposed to this ruling; and he asked the Justices to state a case.

Liverpool Gas-Fittings Company, Limited.—The report of the Directors for the twelve months to March 31 states that the net profit for the year is £1513, which, with £134, the balance after paying last year's dividend and bonus, leaves the sum of £1647 to the credit of profit and loss. The Directors recommend that a dividend be declared for the year at the rate of 10 per cent., with a bonus of 1s. per share (free of income-tax). This will leave a balance of £147 to be carried forward to next year's accounts.

MISCELLANEOUS NEWS.

PUBLIC LIGHTING OF WESTMINSTER.

The New Gas Lighting Contract.

At the Meeting of the Westminster City Council last Thursday, the new gas lighting contract (*ante*, p. 192) came up on a report from the Works Committee.

The Committee stated that the Council having accepted the tender of the Gaslight and Coke Company, for the various lighting units for five years, in the streets at present lighted by gas and in those lighted by the St. James's and Pall Mall Electric Light Company, they had considered a scheme for the distribution of the light and selection of the units, and now submitted same for consideration. The whole scheme, while costing less than the present lighting in the areas affected, would yield two to three times the amount of light; and it should be stated that the needs of each district had been considered separately, and the improvement in lighting spread over every street and every parish. Table I. set out the streets which would be lighted by high-power gas-lamps, in units of 1800 and 3000 candles. Table II. set out the streets which would be lighted with gas-lamps of 300-candle power; and as these would be fixed on existing columns, the lighting of these streets would be very effective. Table III. set out the general distribution of the lamps in the different areas; and from it, it would be gathered that the remaining streets would be lighted by 90 and 180 candle power lamps suitably arranged—thus completing the general improvement in lighting. The numbers of the different unit lamps would be subject to adjustment, as might be found necessary when dealing with each district in detail. Table IV. set out the present cost of lighting the areas in question, and the cost of the new scheme (*a*) for the first five years, (*b*) for the second five years, (*c*) average for ten years. The annual proportion of capital cost was included.

TABLE I.—*Streets to be Lighted with* 1800 *and* 3000 *Candle Power Lights.*

Aldwych	Pall Mall	Victoria Street
Bridge Street	Parliament Square	Waterloo Place
Cambridge Circus	Parliament Street	Whitehall (part)
Charing Cross Road (part)	Piccadilly (part)	Law Courts (refuges)
Coventry Street	Piccadilly Circus	National Gallery (refuge)
Cranbourn Street	Regent Street	Piccadilly Circus (refuge)
Horse Guards Avenue	Sanctuary	St. Martin's Church (refuge)
Kingsway	Shaftesbury Avenue	Trafalgar Square (3 refuges)
Leicester Square	St. James's Street	WellingtonStreet (2 refuges)

TABLE II.—*Streets to be Lighted with* 300-*Candle Power Lamps.*

Artillery Row	Exhibition Road	Knightsbridge
Bow Street	Great Chapel Street	Millbank Street
Broadway	Greycoat Place	Tothill Street
Buckingham Gate	Grosvenor Road	Vauxhall Bridge Road
Caxton Street	Kensington Road (to City boundary)	Wellington Street
Drury Lane		

TABLE III.—*Schedule of Lights at Present Existing and Proposed New Lighting.*

Present Lighting—about 350,000 candles. New Lighting—about 800,000 candles.

	Low-Pressure Gas.					High-Pressure Gas.	Electric Arcs.			Low-Pressure Gas.			High-Pressure Gas.		
Candle-Power.	53.	83.	130.	160.	220.	About 1000.	About 100 .	1800.	3000.	90.	180.	300.	For Refuges 1000	1800.	3000.
A	363	20	3	..	..	..	..	..	..	146	133	107	..	..	..
B	951	79	10	1	..	33	..	..	..	694	110	161	..	59	..
C	254	580	8	8	6	20	..	..	..	406	360	29	10	39	..
D	..	556	6	..	..	..	51	4	16	..	562	..	..	55	16
Totals . . .	1568	1235	27	9	6	53	51	4	16	1246	1165	297	10	153	16

NOTE.—This table excludes the Strand district electric lighting contract terminable in 1913 or 1920, at the option of the Council, and St. George's Parish electric lighting contract, which is not terminable until 1931, but the revision of which the Committee now have under consideration.

TABLE IV.—*Estimated Cost of Scheme Proposed Compared with Present Cost.*

Present Cost (per Annum).	New Cost for more than Double Present Lighting.		
	First Five Years (per Annum).	Second Five Years (per Annum).	Average of Ten Years (per Annum).
£ 15,642	£ 14,450	£ 13,150	£ 13,800
Cost if carried out by electricity . . .	24,900	18,700	21,800

The capital cost of the new scheme (the annual proportion of which, £900, was included in the above estimate) would be £4500—

	£	s.	d.
45 new high-pressure gas-lamps and columns, at £17 . .	765	0	0
10 ,, 1000-candle power refuge lamps, at £5.	50	0	0
71 ,, 3000 and 1800 candle power high-pressure gas-lamps, at £10.	710	0	0
53 ,, 1800-candle power high-pressure lamps on existing gas-columns, at £2 10s.	132	10	0
1246 90-candle power lamps averaging between 7s. 6d. and 25s., say 15s.	935	0	0
1165 180-candle power lamps averaging between 12s. 6d. and 25s., say 20s.	1165	0	0
297 300-candle power lamps averaging between 30s. and 80s., say 50s.	742	10	0
	£4500	0	0

The Committee proposed to endeavour to agree with the Company to a reduction of the tender rates for installation, in consideration of the Council paying the cost thereof on completion, instead of payment being spread over five years as offered by the Company.

In conclusion, the Committee recommended (*a*) That the scheme now submitted for the execution by the Gaslight and Coke Company of the works of installation, lighting, and maintenance of public lamps in districts A, B, C, and D of the city, in accordance with the Company's tender of March 15, 1910, subject to such variation in regard to payment for installation as may be agreed, be approved and adopted, subject to such modifications of the said scheme in detail as the Chairman of the Works Committee may deem to be expedient and necessary as the work of installation proceeds; and that the Town Clerk be authorized to affix the Council's common seal to the contract. (*b*) That the City Engineer be authorized, with the approval of the Chairman, to arrange for the installation by the Gas Company of such specimen lamps of different lighting units as may be found necessary.

The Committee referred, in a further report, to the petition presented to the Council at the last meeting by the ratepayers of St. James's parish, asking the Council to postpone any contract for the gas lighting of Regent Street until the desirability of such a change had been further considered. The Committee stated that a letter had been sent to the petitioners pointing out that, after full discussion, the Council had decided to accept the lowest tender—namely, that of the Gaslight and Coke Company—that a given candle power had exactly the same value whether produced by gas or electricity, and informing the petitioners of the percentages of difference in favour of gas in the tender prices.

Councillor PULMAN said he had been so pertinaciously approached by members of the Regent Street Ward that he felt it his duty to once more raise the question of the expediency of including the St. James's parish in the gas-lighting contract. The streets he took exception to as being included in the contract were some of those in Table I in the report—namely, Pall Mall, part of Piccadilly, Piccadilly Circus, Regent Street, and St. James's Street. It had been pointed out to him that the extra cost of lighting these streets by electricity was approximately £250 per annum; but in view of the rateable value of the streets, and the heavy rates each individual had to pay, it did seem to him that the Council might re-consider the matter. He would say at once that, from his personal experience, he believed that high-pressure gas would be quite as satisfactory as the old light (hear, hear); but the tradesmen in Regent Street appeared to regard the electric light as a sort of fetish, and they alleged that they would be done some injury by the removal of this light in favour of high-pressure gas. This was a point the Council ought to consider; and he moved that they disagreed with the recommendation so far as it referred to the district indicated, and that the Works Committee be instructed to continue the electric light in these streets. It had also been suggested that the St. James's and Pall Mall Electric Light Company had suffered some injustice through the terms of the tenders on which they had to submit their prices, inasmuch as while the Company had plant and mains established in the districts under discussion the tenders were not drawn up in such a manner as to allow the Company to quote for this district only.

Councillor THOMSON-LYON said he did not attach much importance to the petition. He remembered on a former occasion a leading frontager telling him that he had signed a petition merely to get rid of the canvasser. As to a letter from the Electric Light Company that had been sent to every member of the Council, in which they complained that the conditions of the tender were unfavourable to them, he believed it was quite open to the Company to have proposed an alternative scheme; but now that the tenders had been made public, they surely would not allow one of the tenderers to submit new figures.

Councillor GATTI said he would like to point out that there was a distinct benefit in allowing the electric people to continue the lighting in Regent Street. He was glad to see from the discussion at the last Council meeting that the bogus idea prevalent a few years ago that 1-candle power gas was not equal to 1-candle power electricity, or *vice versâ*, was disposed of, and there was no need to argue this point.

Councillor ABADY: You agree with that?

Councillor GATTI: Certainly I do. I always agree with the obvious. (Laughter.) You have this advantage in continuing the electric light—the arc lamps are there, and you save the trouble and the interference with the traffic in using what you have got already, besides, under a new tender, you will have a reduction in the cost of the lighting.

Councillor ABADY: While this matter was being discussed at the last meeting, I suggested that we should delete any streets objected to; and it was denied that we could do this. It is certain we cannot now, having passed the recommendations that we have.

Councillor GATTI said they had a perfect right to go back on the contract; otherwise why was this resolution again before the Council?

Councillor ABADY said he was sorry to trouble the Council again in this matter after the exhaustive manner in which it was dealt with on the last occasion; but there were one or two points he wished to make perfectly clear. To begin with, he wanted to recall to the Council the terms

of the resolution they passed on the last occasion. It was perfectly clear from the resolution that the Council accepted the tender of the Gas-light and Coke Company (which was the lowest) for the districts lighted by them and the areas lighted by the St. James's and Pall Mall Electric Light Company. This was the case; and he understood that the Town Clerk's Department had written to the Gas Company notifying the acceptance of the tender, and had also given notice to the electric people that their tender had been declined, and reminding them that their contract terminated in November, 1910. So that, on the point of the intention of the Council, there was no room for ambiguity. But if Mr. Gatti held that the matter was still before the Council for its consideration, he would submit most strongly that if this was a case where tenders were still before them, the St. James's and Pall Mall Company should be barred from having their tender considered under Standing Order No. 108, which laid down that contractors or tradesmen were prohibited from canvassing members or officers of the Council in support of their tenders. The letter which had been sent to members of the Council, and which was full of misleading statements, contained the following passage: "We trust, in view of the real facts as above, you will see your way to deal with this matter on the merits of the case." If this letter was not canvassing, he would like to know what was. He did not think it was the sort of thing to do. There was another point he wanted to put strongly. Here was a case where the Council drew up specifications and invited rival firms to tender. These firms did so; and the lowest tender was accepted. Then the other tenderer came along and said: "We are very sorry, we made a mistake, we did not understand." It would be striking at the principle of all tendering if a tenderer was to be given the right to revise his prices under any circumstances. He did not think that to a Council with the reputation of the Westminster City Council it should be necessary for him to say anything more on this point. Surely the Council were not going to encourage this Dutch auction sort of business. If they did, they ought to give the Gas Company a chance of having a "pot shot" at the electric light revised prices. In their letter, the Electric Light Company said that, under clause 2 of the general conditions of contract, they were not permitted to tender for the lighting of any particular district, or to submit particular prices for that district. He held that this was not a fair construction to put upon the wording of the clause; and the Town Clerk had given it as his opinion that such a condition could not be read into the contract at all. There was nothing in the clause which said that the contractor was not permitted to tender for a part or district or to submit a special price. It was perfectly clear that the Electric Light Company thought of this idea after they had made the offer in the first place, and saw the lower prices of their competitors. They said that the reason why they had to put up their price for the arc lamps in Regent Street, Pall Mall, and Piccadilly from £17 to £21 or £28 was because they had to consider the possibility of their tender being accepted for other lamps and columns in streets where they might not have mains; and therefore they had to lump the whole cost of the installation on the lamps in Regent Street. This was simply fudge, because the contract was clearly divided into two parts—one for installation and the other for maintenance, and the cost of running mains might affect installation costs, but could not, under any circumstances, affect the maintenance, which would be just the same whether the lamps were on old columns or new columns which might have to be erected, and their cost debited to installation. The contract was perfectly clear in this respect, and there was no room for ambiguity. The maintenance prices of the electric people were exceedingly high. They were £28 as against the Gas Company's £22 in one place, and, he thought, £19 or £20 as against the Gas Company's £15 10s in another. These prices had nothing to do with installation. Mr. Gatti, a Director of an Electric Light Company, had admitted that 1-candle power of gas was equal to 1-candle power of electric light; while the prices for gas were lower beyond all comparison. The Council had accepted the lowest tender; and how could they properly allow one of the tenderers, under the guise of having made a mistake, to tender again? He would stake his reputation that in twelve months' time the shopkeepers in Regent Street and Piccadilly would be sorry they had raised any question on the matter. He was certain they would have the best lighting in London when the installation was completed. He could read extracts from three electric papers all blaming the Electric Company for having charged such a high price.

Councillor PULMAN asked leave to withdraw his amendment. It could not become operative; and after hearing the able speech of Councillor Abady, he was perfectly satisfied that the contract made with the Gas Company was fair and reasonable.

Councillor Captain JESSEL, M.P., also congratulated the Chairman of the Works Committee on his exceedingly lucid and interesting statement of fact. He differed, however, as to there being anything improper in the letter sent out by the Electric Company. It was a course taken on every occasion by companies of this description when they had a case to put forward; and he remembered that not so many years ago the Gas Company, on their tender being rejected, took a similar course.

Councillor GATTI complained that in Table IV. of the report the comparative costs of lighting by electricity and gas were only given over two periods of 5 years and the average over 10 years, though the tenders asked for prices over three periods of 5, 10, and 15 years. If the comparisons had been carried out over 15 years, the Electric Company's proposition would have appeared in a more favourable light. This table indicated to him the general tenour that had run right through the Committee's consideration of the matter. There had been a tendency throughout to make it as difficult for the electric people as possible. There had been conditions imposed which he did not believe were to the benefit of the Council, and which might have been a great burden to the contractor. He admitted at once that the Electric Light Company were not in it for price; but the prices were based on comparisons of five years, which gave the Gas Company the benefit. When Councillor Abady went on to say that the reason why the electric people lost the contract was because the prices were exorbitant, he did not know what he was talking about. Electric light would always be able to hold its own for public lighting as a matter of cost when put on a fair level with gas.

Councillor BINGHAM said he did not like the Electric Light Company being knocked out for this particular reason—he was afraid it was going to do away with competition. But for the stand before made by the St. James's and Pall Mall Company, they would not have now the beautiful light they had in Regent Street. This was going to be substituted by a 3000-candle power gas-lamp; but such a thing did not really exist. There was only one nominal 3000-candle power gas-lamp in existence for street lighting, and that was in front of the Mansion House; and the City authorities reported that they had never succeeded in getting more than 2500-candle power from it. They knew that a nominal 3000-candle power electric light of the present day gave on an average 3500-candle power. They might well forgive the tradesmen of Regent Street for protesting against the removal of the beautiful arc lamps put there only a month ago for something that was problematical. As to the petition, it was signed by tradesmen of Regent Street whose names were known all over the world; and at the meeting held in connection with it, these gentlemen speedily took the conduct of the proceedings out of the hands of anyone who might have been financially interested in the electric light scheme, and managed it themselves.

Councillor ABADY said the reason the comparative tables were not given for fifteen years was that the Committee would not entertain a contract for more than five years, although they offered to make it renewable for a second five years. The comparative prices under these two periods and the average thereon were therefore given. The comparative prices for 15 years were given in the last *agenda*, and the electric light people were high all along the line. The Committee would not look at the contract for 15 years. They had been bitten once. As to the prices given by the electric people, he read an extract from the "Electrical Review" in which it was stated that the tender was too high, and had done a lot of harm to electric undertakings in London and elsewhere.

The Committee's report was then accepted; and the recommendations were passed without dissent.

SHEFFIELD GAS COMPANY'S ORDER.

Fifteen-Candle Gas Prescribed.

At the end of February, an inquiry was held at the offices of the Board of Trade, by the Hon. T. H. W. Pelham, with regard to an application by the Sheffield United Gaslight Company for a Provisional Order to enable them, among other things, to reduce the candle power of the gas supplied by them from 16½ to 14 candles, and to adopt for testing the "Metropolitan" No. 2 burner. The Order has now been issued; and its more important provisions are as follows.

QUALITY OF GAS.

5.—(1) The quality of gas supplied by the undertakers shall, with respect to its illuminating power, be such as to produce at the testing-place provided by the undertakers under the Act of 1855, when burned at the rate of five cubic feet per hour, a light equal in intensity to the light produced by fifteen sperm candles of six to the pound, each consuming one hundred and twenty grains of sperm per hour, and shall be in all respects in accordance with the provisions of the Gas-Works Clauses Act, 1871.

(2) For testing the illuminating power of the gas, the burner to be used shall be that known as the "Metropolitan" argand No. 2, the photometer shall be the bar photometer, the standard light shall be that supplied by Harcourt's ten-candle pentane lamp, and in making the test the burner shall be so used as to obtain from the gas when burned at the rate aforesaid the greatest amount of light. Provided that the Board of Trade may, on the application of the undertakers or the Corporation, approve the use of any other burner, photometer, or standard light which may appear to the Board to be equally or more suitable for the testing.

6.—The undertakers, if and when required, at any time within two years after the commencement of this Order, by any consumer of gas supplied by the undertakers, shall supply him and fix free of charge a sufficient number of flat-flame burners suitable in all respects for the consumption of gas of the illuminating power prescribed by this Order in substitution for the burners (not being incandescent burners) in use at the commencement of this Order.

Notice of the provisions of this section shall be given on each demand note of the undertakers during the period of two years hereinbefore mentioned.

7.—No penalty shall be incurred by the undertakers for defect of illuminating power or excess of impurity in the gas supplied by them in any case in respect of which it is proved that such defect or excess was caused by circumstances beyond the control of the undertakers provided that the want of sufficient funds shall not be held to be a circumstance beyond the control of the undertakers.

MEETINGS, INTERIM DIVIDENDS, AND AUDIT.

8.—(1) From and after the commencement of this Order, section 52 (ordinary meetings to be held half yearly in Sheffield) of the Act of 1855 shall be read, and have effect, as if the words "and the future ordinary meetings shall be held in the month of March in every year, or at such other time as shall be appointed for that purpose by an order of a general meeting," were inserted in that section in lieu of the words "and the future general meetings shall be held in the months of April and October in every year."

ISSUE OF DEBENTURE STOCK.

14.—(1) Sections 9, 10, 11, and 12 of the Order of 1893 are hereby repealed; and in lieu thereof the following provisions shall have effect with respect to the issue after the commencement of this Order of any debenture stock authorized to be created and issued under the powers of the Order of 1893.

(2) All debenture stock so to be issued shall be offered for sale by public auction or tender in such manner, at such times, and subject to

such conditions of sale, as the undertakers shall determine. Provided as follows:—

(A) Notice of the intended sale shall be given in writing to the Town Clerk of the City of Sheffield and to the Secretary of the London Stock Exchange at least twenty-eight days before the day of auction or the last day for the reception of tenders as the case may be, and shall also be duly advertised once in each of two consecutive weeks in one or more local newspapers circulating within the said city.

(B) A reserve price shall be fixed by the Directors, and notice thereof shall be sent by the undertakers in a sealed letter to be received by the Board of Trade not less than twenty-four hours before, but not to be opened till after the day of auction or last day for the receipt of tenders as the case may be.

(C) No lot offered for sale shall comprise debenture stock of greater nominal value than one hundred pounds.

(D) In the case of a sale by tender, no preference shall be given to one of two or more persons tendering the same sum. In the case of a sale by auction, a bid shall not be recognized unless it is in advance of the last preceding bid.

(E) It shall be one of the conditions of sale that the total sum payable by the purchaser shall be paid to the undertakers within three months after the date of the auction or of the acceptance of the tender as the case may be.

THE COALITE PROCESS AND ITS PRODUCTS.

A Report by Dr. Knublauch.

Under date of the 20th ult., the British Coalite Company, Limited, issued to their shareholders a circular letter, giving some particulars as to the "commercial working of the process." The statement—signed by the Chairman (Sir W. H. Preece)—is as follows:

At the last general meeting of this Company, held in December, I informed the shareholders that Dr. Knublauch, of Cologne—the most eminent tar expert in Europe—was investigating the various processes in connection with our bye-products and the tar distilleries at our works.

This exhaustive investigation has now been completed; and your Board take the earliest opportunity of giving you the actual figures based on the commercial working of the process, which fully confirm our previous estimates.

We have now proved in practice that our low-temperature tar, produced from one ton of coal, contains:

4·75 gallons of naphtha solvents.
4·07 „ tar acids.
3·10 „ disinfectant oils.
98 lbs. of pitch or coalite bitumen.

We are pleased to inform you that contracts have been made for the sale of the whole output of naphtha solvents and tar acids from our Wednesfield works for the next six months at very satisfactory prices.

We have also sold during the past two months 150 tons of our bitumen at an average price of £3 18s. per ton; and, following Dr. Knublauch's advice, we are sanguine we shall get still better prices in the future.

Our sulphate of ammonia sells readily, as soon as it is made, at about £12 per ton.

These contracts and sales show us that the estimate we have placed on the value of our low-temperature tar has been more than borne out. We obtain practically twice the amount of tar in bulk produced under the ordinary gas process.

Our solvent naphthas are already being appreciated by rubber manufacturers, dry-cleaners, dyers, &c.; while our bitumen and coalite pitch, in which "free carbon" is non-existent, constitute perfect non-conductors of electricity—proving highly advantageous for insulating purposes in connection with electric cables of all kinds.

In addition to the above, our bitumen is also being used for waterproof materials, asphalte, felt roofing, varnish, glue, and ship's deck caulking.

Our tar acids and disinfectant oils, Nos. 1 and 2, will prove of great service to the large disinfectant manufacturers.

The tar distillery, which is in course of erection at the Barking works, will be brought into operation next month, and will place a large further supply of the various distillates above mentioned at the disposal of the Company, and for which satisfactory markets are waiting.

Owing to the large demand for our smokeless fuel ("Coalite") at the end of last year, we decided to raise the price of this domestic commodity and commercial necessity; and we are glad to advise you that, even at the higher price, our sales, since February, have considerably increased.

Mr. F. H. Smith has been appointed General Manager and Engineer to the Company in succession to Mr. H. Gamman.

Another Cause of Weakness in the Company's Shares.

Noting the circular, the "Iron and Coal Trades Review" says: "In this connection, it is interesting to refer to an article in the 'JOURNAL OF GAS LIGHTING,' of April 12, headed 'Weakness in Coalite Shares.' In this paragraph, the Editor of the 'JOURNAL OF GAS LIGHTING' makes a number of guesses as to the cause of the fall in the shares, and suggests that somebody is unloading shares on the market. While this may be true, it would seem that there is likely to be another reason for the weakness of these shares. The Coalite Company recently opposed the granting of the patent under which a Glasgow syndicate propose to manufacture and put on the market smokeless fuel. The patent was opposed on the ground that it infringed what the Coalite Company regard as, and claim to be, their master-patent, and on which the value of all their further and subsidiary patents must largely depend. The Coalite Company have failed in their action; and they now know that they do not hold a monopoly (as they have hitherto claimed) of the manufacture of the class of material made by them, but that the Scotch Company in question are equally free to manufacture, and are likely to soon put on the market, a material which is in all and every respect equal to their own. This in itself is sufficient to make the shares suffer considerably in value."

MANCHESTER AND ITS RATES.

Like the Gas Committee, the Electricity Committee of the Manchester Corporation, though pressed by the members of a deputation including the Lord Mayor, have declined to increase their grant in aid of the rates out of the profits of the department. The amount to be contributed by the electric works will therefore be £12,000 as last year; and the Gas Committee will hand over £40,000. Each spending Committee has had to revise its estimates; and the Finance Committee hope, with the economies effected under this head and an increased sum from the tramways (£75,000, instead of £60,000), to keep the rates at the same level as last year.

A member of the City Council, discussing the situation, thus expressed himself: The time has arrived for a more sane policy with regard to the estimates. We have had Committees this year actually reducing their figures by £20,000 at the instigation of the Lord Mayor and the Chairman and the Vice-Chairman of the Finance Committee. What is the reason? Simply because they knew that the inevitable deputation would come along, and they could make a great show of their desire to avoid any increase in the rates. Obligations that are real are always met in a private business of financial standing; and the same rule should apply to municipal undertakings. It is for this reason that I admire the attitude of the Chairman of the Electricity Department and the members of his Committee. They declared at the first estimate that they were prepared to give £12,000 in relief of the rates; and in spite of deputations, they refused to increase the amount—being more desirous to supply current at the lowest possible rate. On the other hand, the Tramways Committee fixed their first estimate at £60,000, well aware that a further sum would be demanded. Along comes the civic deputation, who secure a sort of promissory note for another £15,000, and beg the Committee to preserve the utmost secrecy regarding the extra grant, in order that the deputation might be able to squeeze the Electricity Committee, the Gas Committee, or anybody else. This is the modern obligation put upon a Lord Mayor.

QUESTION OF THE RATES AT ROCHDALE.

Rochdale rates will for the ensuing year be the same as last—namely, 7s. 9d. in the pound. This has only been made possible, however, by a pruning of the estimates of the different spending Committees, and forcing the gas and electricity undertakings respectively to give £1000 more out of profits than the Committees controlling these departments considered fair. Thus, the Gas Department will contribute out of profits £9000, instead of £8000; and the Electricity Department £5000, in place of £4000.

The Town Council, meeting in General Committee last Thursday, approved of the "budget" as revised. The proposal to take an extra £1000 from the gas-works profits met with considerable opposition, as did the further "milking" of the electricity profits by a similar amount. Mr. Walker, the Chairman of the Gas and Electricity Committee, objected strenuously to both propositions—especially the first. It was pointed out in regard to the gas-works that the department had a heavy expenditure to meet, and that this must be provided for out of reserve and revenue. The new works would cost £25,000; and towards this there would have been only £16,000 in the reserve fund, if the £5500 which the Committee proposed to allocate this year had been added. To take away another £1000, would leave £10,000 still to be raised for the re-building and equipment of the retort-house. Mr. Walker also stated that in the last sixteen years no less than £175,000 had been contributed out of gas profits to the relief of rates, as much as £7700 being taken from the reserve. Other members of the Council objected to the system of making large gas profits for rate relief, as being an unfair form of indirect taxation—arguing that gas consumers were entitled to relief in the shape of a reduction in price.

For the Electricity Department, it was submitted that, owing to the short life of the machinery, the concern should be differently treated, and be allowed to make reasonable provision for depreciation. To all the appeals on behalf of the two departments, however, the Council turned a deaf ear, and "seized," as one member put it, an extra £1000 from the profits of each. The Finance Committee's report was finally approved.

BLACKPOOL GAS-WORKS PROFITS.

Mr. John Chew, the Manager of the Corporation Gas-Works, has, says the "Blackpool Times," always produced a handsome profit at the end of each year; and the Council always look with confidence to him having a net balance in excess of the estimated surplus. So faithfully has he lived up to this expectation, that the gas undertaking has come to be regarded as the "milch cow" for the Corporation. Once more has Mr. Chew accomplished a fine piece of management, in exceeding the estimated profit in the year just ended (March 31); for, according to the statistics submitted to a meeting of the Gas Committee a few days ago, the net available balance for the relief of the rates is £9557—being £1666 more than the estimate, and £764 in excess of the actual profit for the previous year. The income was only about £500 more than for the year 1909—being £85,889, as compared with £85,397—and is £1581 more than the estimated amount. Mr. Chew, by wise and judicious administration, gains in the working expenditure for the year; for while the estimated amount was £63,006, the actual was £62,991. This, with £11,232 allowed for interest and sinking fund,

and £2109 contribution to the reserve fund, reduces the gross profit of £22,898 to the amount already mentioned as available for the relief of the rates—£9557. It might be anticipated that this would be somewhere near the estimate for the ensuing year; but a careful computation shows that the total cost for the manufacture of gas is expected to be £50,875—an increase on last year, accounted for by the fact that the price of gas coal is again rising, notwithstanding that steam coal shows a falling tendency. Hence the estimated net profit for the coming year is placed at £7461; but it will be surprising if Mr. Chew does not improve on this in actual results. He has never failed to do so.

Blackpool's indebtedness to the gas undertaking for the relief of rates during the time that Mr. Chew has had the management was never so clearly demonstrated as when he informed the Gas Committee, at the meeting above referred to, that the total reached £280,000, £75,000 to the reserve fund, and £10,000 to the renewal fund. Truly a remarkable record since 1869, when the Corporation took over the gas undertaking. Other interesting facts were placed before the Committee, over which Alderman J. Battersby presided. It was shown, for instance, that 55,000 tons of coal are used at the gas-works; that the actual output of gas last year was 555 million cubic feet (an increase of 22 millions over the previous year); and that customers number 14,150—670 new ones having been added in the year, demonstrating a satisfactory growth of the borough. From the report submitted, the candle power of the gas manufactured is maintained at a high standard; but if all customers used incandescent mantles for lighting purposes, the Corporation could manufacture gas of a lower standard at a cheaper rate, which would have greater heating power for cooking purposes, and the public would have quite as good an illuminant by means of the incandescent mantle. This is a point that the general body of ratepayers should bear in mind, if they are desirous of the gas undertaking becoming even more profitable than at present.

GAS INSPECTION IN CANADA.

The Proposed New Regulations.

In the "JOURNAL" for March 29, p. 885, some of the contents were given of a Bill before the Canadian House of Commons to amend the Gas Inspection Act. In the last number to hand of the "Gas Journal of Canada" the proposed changes in the law of the Colony are editorially referred to.

Our contemporary writes: Generally speaking, there are no radical changes proposed to which the gas companies could make serious objection, though two of the regulations recommended are somewhat new to the gas practice in Canada, as follows:

> "(*b*) In the case of inodorous gas, to require the addition of such substances as the Governor-in-Council deems necessary, in order to communicate odour."
>
> "(*c*) To establish regulations for the testing of the calorific power of gas."

Inodorous gas, so far as artificial practice is concerned, is a thing not known; and it is scarcely likely that this new feature will disturb the present methods of manufacturing gas, or impose additional expense upon gas companies for such substances or chemicals as are deemed necessary for communicating odour. This, however, may be a regulation that natural gas men in some districts would offer objection to; natural gas free from sulphur being more inodorous than coal or water gas. The regulation which provides for the establishment of rules for the testing of the calorific power of gas, we think, will be welcomed by the Canadian Gas Association, because they have been working along these lines for now over a year, with the intention of making some recommendation to the Government concerning the lowering of the candle power, and the possible substitution of a calorific-power test for the candle-power test. We are not sure as to whether the Governor-in-Council intends to establish a calorific-power test to regulate the supply of gas, or whether it is simply an instruction from him to the gas inspectors to familiarize themselves with the testing for calorific power, recognizing, as he doubtless does, that the calorific-power test will be the test of the future. What the precise meaning of the regulation is, the gas fraternity will anxiously await a fuller explanation.

UNITED STATES STREET LIGHTING AND WATER SUPPLY.

Comparisons appear in the United States Census Bureau's report for the year 1907 on the statistics of the 158 cities having a population of over 30,000.

The section devoted to the subject of street lighting includes payments for expenses of street lighting per acre of land area and *per capita*, lights classified by kind, number, candle power, price per light per year, number of hours lighted per year, and average number of each kind of light to each 100 miles of streets. The cities with the highest *per capita* payments for lights were Yonkers, New York ($1·59), and Los Angeles ($1·37); and those with the largest payments per acre of land area were Hoboken ($35·03), and Boston ($32). Owing to the great length of their unimproved streets, the average number of lights to 100 miles of streets is very small in some cities. Of the cities using Welsbach lights, largely in the residential districts, Boston leads in the number used in proportion to street mileage, followed by Washington, St. Louis, Cleveland, New York, and Baltimore. In comparison with similar statistics for 1905, it is seen that the flat-flame gas-lamp is fast disappearing from use; the percentage of decrease in number reported amounting to 43·7. This decrease has been offset by a large increase in the number of Welsbach incandescent and arc lights.

Of the 158 cities, 117 owned water-supply systems whose estimated value at the close of 1907 was $647,334,495. The revenue receipts from the public amounted to $52,831,096, and the actual expenses of operation to $21,231,273. The excess of receipts over operating expenses was, therefore, $31,599,823, nearly two-fifths of which was consumed in payment of interest on the outstanding debt. The remaining three-fifths was apparently net profit; but it is impossible to argue from this result that municipally owned water-supply systems are exceedingly profitable. Cities owning their water-works do not receive taxes from them, and in few cases charge off a sufficient amount for depreciation. The report states that the financial results indicate, when these factors are taken into consideration, that few systems are operated at great profit, while some are conducted at an actual loss. Some cities, however, aim to furnish water to their citizens at cost; and it is possible that in such cities water-rates are lower than they would be if the water system was owned by private parties.

A PRESENTATION AT STOCKTON.

The officials and workmen of Ashmore, Benson, Pease, and Co., Limited, of Stockton-on-Tees, had a pleasant gathering on the 19th ult., for the purpose of bidding "Good-bye," and making a presentation to the General Manager, Mr. T. P. Barker, who has resigned his position to take up the more important post of Managing-Director of Messrs. Thomas Piggott and Co., Limited, of Birmingham. The meeting took place in the large machine shop at the Parkfield works; and the number present was about 600. The presents, which took the form of genuine antique Sheffield plate, consisted of a pair of handsome candelabra, three pairs of candlesticks, a tea and coffee service, and a beautiful jardinière centre-piece about 36 inches high.

Mr. W. Beswick (who succeeds Mr. Barker) was in the chair, and in opening the proceedings remarked that it was with mixed feelings that the company had assembled. On the one hand, they were losing a chief who had been very much liked and esteemed, and who came to the Company's service when they were badly in need of a man of Mr. Barker's experience and ability. Mr. Barker had been very kind and considerate to those who had served under him, and in parting with him all would have feelings of regret. He was going to a position of greater responsibility; and in leaving Parkfield he would carry with him the good wishes of all who had been co-operating with him. They wished him and his wife prosperity, health, happiness, and well-being. At the last Board meeting of the Company, the Chairman expressed the regret of the Directors at Mr. Barker's resignation; and a resolution was unanimously passed expressing hearty appreciation of his services during the past five years as General Manager, and good wishes for his success in his new appointment. There was the pleasing fact that Mr. Barker was leaving in the height of prosperity. During his five years of "generalship," the Company had been passing through a time of great depression; but fortunately the works had been well employed, which meant much to the employees. Mr. Barker had been to the far ends of the earth to get orders, and had been very successful in doing so.

Mr. Hodgson, in a well-chosen speech, asked Mr. Barker to accept the gifts from the officials and workmen at Parkfield, the agents of the Company, and the erectors. He offered Mr. Barker the congratulations of everyone on the new and important position he was called upon to take up. The presents were not, he said, offered for their intrinsic value, but as a token of true affection, regard, and esteem; and the donors hoped they would recall many happy memories of Stockton.

Mr. Barker thanked them all for the support and co-operation received during his five years of office, as well as for the beautiful gifts, which, he remarked, would be treasured by himself and his wife as long as they lived, and would afterwards be a heirloom in the family. They would be a constant reminder of the five years he had laboured in Stockton, and of those with whom he had been associated during his term of office there. They had been reminded that the past five years had been lean ones; but he was thankful he had been able to scrape enough work together to keep the "ship sailing," if the cargo had not been quite a full one. He hoped the future would be satisfactory to the workmen, officials, directors, and shareholders. He thanked them all, and wished them "Good-bye."

Mr. Griffiths and Mr. A. E. Atkinson having also addressed the gathering, a hearty vote of thanks was accorded to Mr. Beswick for presiding, and to Mr. Hodgson for the way in which he had voiced the feelings of all the subscribers to the presentation. Three cheers for Mr. and Mrs. Barker, and the singing of "He's a Jolly Good Fellow" concluded a very pleasing function.

Gas Profits at Nelson.—The gross profit for the Nelson gas undertaking during the past year amounted to £16,295. After setting aside £11,945 for interest and sinking fund charges, there remains a net surplus to be carried to revenue appropriation account of £4350. This has been arrived at after allowing £400 in settlement of claims and expenses in connection with a gas explosion, and £300 for extensions at Brierfield. Given an increased consumption of 5 per cent., it is estimated that there will be a net surplus next year of £5035.

ASSOCIATION OF MUNICIPAL CORPORATIONS.

There was little of direct interest to "JOURNAL" readers in the proceedings at the recent meeting in London of the Association of Municipal Corporations; but two short extracts from the address of the President (Mr. J. S. Harmood-Banner, M.P.) are given below.

UNDUE GOVERNMENT INTERFERENCE.

With regard to legislation of 1909, one of the features not only of the last session, but for several years past, has been the increasing desire on the part of the Government Departments to obtain more or less absolute control over local authorities. This is, I think, one of the greatest dangers threatening municipal life at the present time, and unless it is faced, and wherever possible averted, it will in time go far towards depriving municipalities of that reasonable degree of independence which they have enjoyed in the past, and in the enjoyment of which they have achieved many things for the welfare of the country. We do not, of course, claim that they should be uncontrolled in all their actions. When they seek to make new bye-laws, which are to become part of the local law of their towns and binding upon all the inhabitants, we agree that it is not unreasonable that a central department should have a voice in framing such bye-laws, so that any objections may be impartially considered and conflicting interests adjusted. Again, where it is sought to borrow money which might become a burden upon a future generation of ratepayers, it is fully recognized that some Government control is justified.

While, however, we do not object to reasonable control in regard to matters of this kind, it appears to me that the action of the Government Departments is, according to the modern practice, going too far—both in that they seek to interfere in regard to matters of administration frequently of a comparatively trivial character, which ought to be left to the persons elected for the purpose, and in that they seek to take the initiative and to force local authorities into action against their wishes.

MUNICIPAL TRADING.

We do not hear so much on the subject of municipal trading from our critics; and we may take it, I think, that most reasonable persons have been by this time convinced by the action of municipalities during (say) the last decade that, in providing such important public services as the supply of water, electricity and gas, tramways, and other matters, they have met the public requirements both efficiently and economically. I observe that Mr. Balfour Browne, K.C., has been secured by the Society of British Gas Industries as their President this year; and in his presidential address he complains of the want of security of capital invested in gas and water undertakings, owing to Parliament conferring powers for the compulsory purchase of such undertakings. The complaint appears to me entirely unfounded, as the invariable practice of Parliament when giving powers for the compulsory purchase of gas and water is to fully compensate the shareholders for the loss of their revenue—and, indeed, I should think it highly probable that many of those who were shareholders in the late London Water Companies have been able to invest their money in equally sound securities, and are receiving a larger income therefrom.

It appears to me to be eminently satisfactory that Parliament should allow local authorities to acquire these undertakings—fair terms being, of course, conceded—particularly undertakings for the supply of water. No water company would be prepared to incur such heavy capital expenditure as the large corporations have incurred in recent years in making provision for the supply of water to their inhabitants—not with the view to obtaining an immediate return in money, but with the view to rendering an adequate supply of water absolutely secure for many years to come. Such works, for example, as those which the Liverpool Corporation have completed at Vyrnwy, and which, on their completion, were opened recently by the Prince of Wales, would never have been undertaken if the supply had been in the hands of a company. When we remember that these magnificent works will, no doubt, last for centuries, I think we all agree that municipal trading has done its work.

Public Lighting at Launceston.

A report presented to the last meeting of the Launceston Town Council by the Lighting Committee recommended the adoption of the meter system in connection with the payment for lighting the public lamps, and that all the lamps be supplied with incandescent burners. It was also proposed that the use of bye-passes be reconsidered. Mr. Hicks, in moving that the Committee be empowered to negotiate with the Gas Company for a supply of gas on this basis, said that for some years there had been dissatisfaction with the existing arrangement; and though they had never had a Committee more friendly disposed to the Gas Company than the present one, some alteration was desirable. They did not know how the Company made up their figures, and how much gas was really consumed. If they adopted the meter system, they would have the satisfaction, whether they saved money or not, of knowing how much gas they consumed, and whether they were paying for what they used. It was proposed to put meters on certain lamps, and strike an average. At present, there were 123 lamps in the town, of which 79 were incandescent. The Mayor said the alteration of the remaining lamps to the incandescent system would cost £90 to £100; but it would result in economy. Mr. Treleaver, jun., thought that the Committee would be unwise to discontinue the use of all bye-passes. In some situations, they were necessary for the protection of the mantles. The recommendation of the Committee was unanimously approved.

Imperial Ottoman Gas-Works, Constantinople.—Owing to improved working results and greater economy in the management, the Council, acting upon the advice of their Engineer (Mr. W. S. M'Gregor) have reduced the price of gas by 10d. per 1000 cubic feet—the reduction taking effect from the 1st ult.

MAIN

SUMMER SEASON 1910.

COOKERS

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MAIN

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

There has not been much progress in the determination of the question of what to do with the Glasgow Gas Consolidation Bill; but, as was stated in the Town Council last week, there is time to consider it before Parliament sits again. The Bill has passed its third reading in the House of Commons. Locally, what has happened this week is that on Tuesday the Parliamentary Bills Committee met and had a long discussion upon the situation. A motion was made that the Corporation proceed with the Bill, and an amendment that it be dropped was moved. Neither of these was adopted, as, on the suggestion of Mr. M. W. Montgomery, the Convener of the Gas Committee, it was agreed to postpone coming to a decision until after the meeting of the Gas Committee. The Gas Committee held a special meeting the next day, and, after a long discussion, resolved to re-commit the matter to the Parliamentary Bills Committee. Whatever resolution this Committee may come to will be submitted to the Town Council.

At the ordinary monthly meeting of the Edinburgh and Leith Gas Commissioners on Monday, the minutes submitted gave the information that the purchases of coal, agreed upon at a meeting on April 11, amounted to a total of 204,500 tons. Mr. W. R. Herring, the Engineer, reported that the German Association of Gas and Water Engineers, who were to be in this country next month, desired to visit the Granton Gas-Works, and were also to visit gas-works in Glasgow. The approximate date was May 24; and the most convenient arrangement would be that they should visit the Granton works in the morning, as in the afternoon they would go to Glasgow, where they were to be entertained at a banquet in the evening. If it were the wish of the Commissioners that the visitors should see the gas-works, the question remained whether they should entertain them at luncheon at the works. Lord Provost Brown thought they should fall in with the arrangement, having regard to the manner in which all of them had received kindness in Germany and France, and elsewhere, when they had gone on municipal business of any kind. The Commissioners agreed to the proposal, and appointed a Committee to make arrangements for the visit.

The list of applicants for the post of Treasurer and Collector to the Edinburgh and Leith Gas Commissioners has now been reduced from 113 to 4. The appointment is to be made at a special meeting of the Commissioners on Monday.

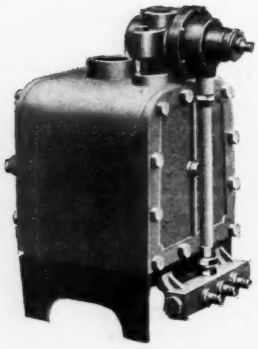
The announcement is made in the "Fife Free Express" to-day that "the Directors of the Kirkcaldy Gaslight Company, Limited, held a meeting on Tuesday, at which a resolution was passed expressing their sense of the loss the Board had sustained by the death of one of their number, who was also Chairman of the Company—Mr. George Prentice Davidson—and instructing the Secretary to send on an extract of the minute to his relatives. To fill the seat on the Board thus rendered vacant, the meeting unanimously appointed Mr. Adam Macpherson, who for many years, as their Engineer and Manager, so successfully conducted the business of the Company; and they thereafter elected him to the chairmanship of the Board. In view of the Corporation acquiring the business of the Company, we consider this a wise and prudent selection, and one which we are sure will meet with the cordial approval of the shareholders, by whom Mr. Macpherson is so highly and deservedly esteemed." It is also announced that, in view of the transfer, a deputation from the Kirkcaldy Town Council, consisting of Provost Munro Ferguson, M.P., and others, had an interview last week with the permanent officials in the Scottish Office in London, at which some discussion took place with regard to the sinking fund and the division of the profits; and that the deputation also discussed the question of acquiring control of the foreshore.

A gas transfer is in progress at Barrhead; and in connection with it a poll of the ratepayers was taken last Saturday, upon the question of the adoption of the Burghs Gas Supply (Scotland) Act of 1876. Only 542 votes—less than a fourth of the ratepayers—were recorded. The result was: For, 446; against, 96. There was thus a majority of 350 in favour of the proposal.

The Gas Committee of the Dundee Town Council have agreed to recommend that a contribution of ten guineas be made to the William Young Memorial Fund.

This afternoon a woman named Black, residing in Livingstone Place, Edinburgh, was found dead in her house. She had taken her seat beside a small gas-fire, having a flexible tube, and had lifted the fire on to her lap; the gas being turned on. It was in this position that she was found by her son when he returned from work. A medical man was called, who pronounced life to be extinct.

Preparations are being made for raising the level of Lintrathen Loch, from which the greater portion of the water supply to Dundee is obtained. A Sub-Committee have reported to the Water Committee of the Corporation that, in proposing to raise the loch from 676 to 680 feet Ordnance Datum, the Engineer—Mr. J. Baxter—is simply resuscitating a scheme which was adopted by the Commissioners in 1890, and for which powers were obtained by the Dundee Water Act of 1891. The works were estimated by the then Engineer of the Department to cost £17,642, independent of land claims, tenants' damages, engineering fees, and parliamentary expenses. The statutory powers obtained in 1891 were allowed to lapse, because an arrangement was come to under which less water was required to be given as compensation. In 1890, the average daily consumption of water was 8,705,551 gallons per day during the past six months, it has been at the rate of 11,592,000 gallons—an increase of nearly 3 millions per day. Mr. Baxter has pointed out that the existing storage at Lintrathen is only capable of supplying the requirements of the undertaking with 10½ million gallons daily over 150 days of drought. Therefore, in dry weather, the old works at Monikie, which are capable of yielding 2 million gallons per day, alone prevent a shortage of supply. The proposals submitted by Mr. Baxter include all the works previously recommended and approved of; and their construction would increase the storage capacity of the reservoir from 1601 to 2175 million gallons, and would provide for an average daily draught of 14½ million gallons over a period of 150 days



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of extremely dry weather. Mr. Baxter's estimate is £15,000; but he expects to be able to accomplish the work within this figure, if it be taken in sections, and the administration be under his own supervision. Almost all the expenditure will be required for wages; there being sufficient material available within the Commissioners' own grounds. The Water Committee were of opinion that they could not, in view of the advice given by the Engineer, longer delay the execution of the work; and they resolved to recommend to the Town Council that the work be proceeded with as suggested, and that a Provisional Order authorizing it be applied for. Having regard to the fact that the work devolving on Mr. Baxter during the next two years will be exceptionally heavy, and that he will have increased personal expenses in carrying through the scheme, it is recommended that they agree to pay him, after the works have been completed, a sum sufficient to cover all his reasonable outlay.

After an inquiry extending over ten days, and involving the examination of thirty-six witnesses—nineteen on the side of the promoters and seventeen on the side of opponents—a House of Lords Committee on Thursday rejected the Avon water scheme of the Corporation of Aberdeen. The scheme was first suggested in 1898. It was adopted by Mr. Alex. Wilson, now Lord Provost of the City, who became its champion, and has striven to have it carried into effect, but as yet unsuccessfully. Aberdeen is at present supplied with water which is taken from the River Dee, about twenty miles up the river. It has all along been an unsatisfactory supply, in the matter of purity, in consequence of which the attention of public men has frequently been occupied by the problem of finding another source of supply. Various schemes were considered; and in the end the Town Council adopted that in which it was proposed to take water from the River Avon. The Avon is a tributary of the Spey, and therefore outside the natural watershed for Aberdeen. The scheme involved the construction of a reservoir of immense size at Inchrory, at the eastern base of the Cairngorm Mountains, and of an aqueduct forty-seven miles in length. The cost, for a first instalment of 10 million gallons per day, was estimated by Sir Alexander Binnie and Mr. G. F. Deacon at £1,068,500. The scheme was fiercely opposed, chiefly by city traders, in whose opinion the present supply could be augmented and made quite satisfactory, by filtration, at a cost of £600,000. The Avon water is of sufficient purity not to require any treatment. As indicated above, the Parliamentary Committee refused to pass the preamble. There is much consternation in the city at the result, not only on account of the loss of the measure, but of the costs incurred, which are estimated to amount to not less than £10,000.

Great scarcity of water has been experienced in the Rhymney Valley, chiefly in Bargoed, Tirphil, and Brithdir. The cause of the water stoppage is said to be a further burst of the Rhymney and Aber Valley Water Company's mains about a quarter-of-a-mile below Pontlottyn. This trouble is the result of subsidence near the spot where the mountain was recently reported to be moving.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *April* 30.

Sulphate of Ammonia.

During the week there has been again an inactive market, and the demand has barely been sufficient to absorb current reduced output. This has resulted in a further decline in values; and the quotations at the close are £12 per ton f.o.b. Hull, £12 1s. 3d. to £12 2s. 6d. per ton f.o.b. Liverpool, and £12 per ton f.o.b. Leith. Although there have been several inquiries in the forward position, no actual business has transpired; the ideas of consumers and makers being too divergent to admit of transactions taking place.

Nitrate of Soda.

The tone of the market for this article has become rather easier again, and the price has been reduced to 9s. 6d. per cwt. for ordinary quality and 9s. 9d. for refined, on spot.

LONDON, *May* 2.

Tar Products.

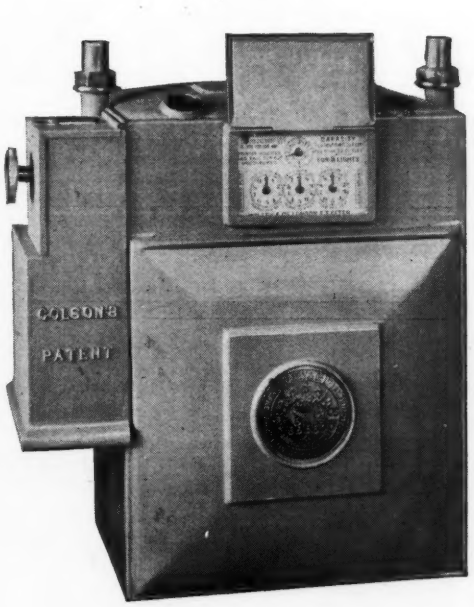
The markets for tar products have been very firm during the past week—one notable feature being the substantial rise in pitch since the last report. Crude carbolic remains about the same; and it is very difficult to do business in this article. Benzol and naphthas are firm, and prices are well maintained. Creosote is steady; but the business transacted is not very large.

The average values during the week were: Tar, 18s. to 22s., *ex* works. Pitch, London, 38s. to 38s. 6d.; east coast, 38s. to 38s. 6d.; west coast, 38s. to 38s. 6d. f.a.s. Mersey ports, 38s. 6d. f.o.b. others. Benzol, 90 per cent., casks included, London, 8d. to 8½d.; North, 8d.; 50-90 per cent., casks included, London and North, 9d. Toluol, casks included, London, 10½d.; North, 10d. to 10½d. Crude naphtha, in bulk, London, 4¼d. to 4⅜d.; North, 4¼d. to 4⅜d.; solvent naphtha, casks included, London, 1s. 3½d. to 1s. 4d.; North, 1s. 4d. to 1s. 6d.; heavy naphtha, casks included, London, 1s. to 1s. 1d.; North, 11d. to 1s. Creosote, in bulk, London, 2½d. to 2⅝d.; North, 2d. to 2¼d. Heavy oils, in bulk, 2¾d. to 2⅞d. Carbolic acid, 60 per cent., casks included, east coast, 1s. 0½d.; west coast, 1s. Naphthalene, £4 10s. to £8 10s.; salts, 40s. to 42s. 6d., bags included. Anthracene, "A" quality, 1¼d. to 1⅜d. per unit, packages included and delivered.

Sulphate of Ammonia.

The market has shown a further weakening during the past week; but there was little business transacted towards the close, owing to manufacturers being slightly more reasonable in their ideas. To-day, Beckton is quoted at £12 2s. 6d.; London, £11 12s. 6d. to £11 13s. 9d.; Hull, £12; Liverpool, £11 18s. 9d. to £12; and Middlesbrough, £11 18s. 9d. to £12.

The Parish Council at Chiddingfold (Sussex) have resolved to support a private company for supplying water to the district.



COLSON'S PATENT CASH BOX

EFFECTUALLY PREVENTS THEFT OF CASH FROM PREPAYMENT METERS.

Can be supplied Fitted to

THE "WILLEY" METER.

WILLEY & CO., Ltd., LONDON AND EXETER.

SHOW-ROOMS: LONDON, 18, Adam Street, Adelphi, W.C.; DEVONPORT, 93, Fore Street.

COAL TRADE REPORTS.

Northern Coal Trade.

There is now a fuller production of coal at the Northern collieries, and prices have shown ease. In the steam coal trade, best Northumbrians are from 11s. 3d. to 11s. 6d. per ton f.o.b.; and second-class steams are also a little lower at from 10s. 3d. and 10s. 9d. per ton, with a rather limited business. Steam smalls are generally steady, and prices vary from 6s. 3d. to 7s. 6d. per ton f.o.b. It is hoped that there will be a better demand for steam coals now that the shipping season is being entered upon. In gas coals, the local consumption is less, but there is a fair shipment generally. Prices are easier, with Durham gas coals from 10s. 2d. to 10s. 9d. per ton f.o.b., according to quality, for the usual classes; and "Wear specials" are about 11s. 6d. per ton. In contracts, those for the Companies of the Metropolis make slow progress—offers and counter offers defining prices only slowly. It is, however, quite possible that ultimately there may be a settlement somewhere between 10s. and 10s. 3d. per ton; but as some of the Companies have full stocks, the settlement is not pressed forward by them. One or two small quantities of gas coal have been contracted for at near the current quotations—for export, during the season. In the coke trade, the demand is steady; and with a limited production, gas coke is firm at from 14s. to 14s. 3d. per ton f.o.b. on the Tyne for good quality.

Scotch Coal Trade.

The coal market has been quiet and without any special feature, except that splint is not going off so well, and there is an easier tendency in price. Ell is in fair request for prompt shipment, with the price steady. Treble and double nuts are not in demand. All kinds of small are being disposed of promptly, and prices continue firm. The quotations are: Ell, 9s. 9d. to 10s. 3d. per ton f.o.b. Glasgow; and splint and steam, 10s. to 10s. 6d. The shipments for the week amounted to 322,283 tons—an increase of 6991 tons upon the preceding week, and of 16,782 tons upon the corresponding week of last year. For the year to date, the total shipments have been 4,720,110 tons—an increase of 615,788 tons upon the corresponding period.

Tar Spraying of Roads.—It has been decided by the Exeter City Council to accept a tender of £400 for the tar spraying of certain roads. Mr. Varwell said they were all agreed as to the desirability of tar spraying; but the roads should be put in a suitable state first. It was useless to do it on rough, uneven surfaces. Mr. Gardner, in reply to a criticism of the cost, said the price quoted was less than that at which the Corporation could do the work, besides which they would have to buy a suitable machine at a cost of £100 to £150. Mr. Reed stated that the price quoted was ⅝d. per superficial yard, and he knew another public body who were paying 1d.

Llandrindod Wells Gas Company.

The second annual general meeting of the Llandrindod Wells Gas Company was held at the Offices of the Company, No. 17, Victoria Street, Westminster, S.W., on the 25th ult.—Mr. Charles Hunt in the chair. The report stated that there were now 210 consumers; and additional applications for gas were under consideration. The accounts showed that the result of the first eight months' trading was a small profit, after paying all the expenses incidental to the starting of the works. In moving the adoption of the report and accounts, the Chairman said that he had recently paid a visit to Llandrindod Wells, and was gratified with the signs of progress which were there exhibited, and which augured well for the future of the Company. The retiring Director (Mr. F. R. Smith) and the retiring Auditor (Mr. F. A. Caddick) were re-elected. The meeting was afterwards made special, and a resolution adopted authorizing the Directors to exercise the borrowing powers of the Company by the issue of debenture stock. A vote of thanks to the Chairman terminated the proceedings.

Gas Purchase Question at Monaghan.

The Monaghan Urban District Council some time ago had under consideration the question of introducing electric light into the town; but one member suggested as an alternative that the Council should acquire the gas-works. As the result, the Gas Company held a meeting for the purpose of ascertaining the minds of the shareholders as to the disposal of their property. After discussion, the following resolution was passed by a majority; many proxies being recorded against selling the property: "That we, the shareholders of the Monaghan Gas Company, summoned to consider at this extraordinary general meeting the proposal of the Monaghan Urban District Council to purchase the Company's works and plant, together with their entire interest in the same, hereby agree to sell the said property at a fair and reasonable price, the value to be ascertained by two expert Arbitrators, one to be appointed by the Company and one by the Urban Council, with power to call in an Umpire in the event of their failing to agree; the award of the two Arbitrators to be final, and should they fail to agree the Umpire to decide. Further, that before the Arbitrators are appointed, the parties shall sign a deed binding themselves to carry out the award as determined by the foregoing arrangement. We further make it a condition of the said contemplated sale that the present Manager be retained in office, subject to his being paid at least his present salary and emoluments."

Birmingham Gas Profits.—At a meeting of the Gas Committee of the Birmingham Corporation on Monday of last week, it was announced that the amount to be handed over to the rates as the result of last year's working will be not less than the amount for the previous year, which was about £71,000. The exact sum has not at present been ascertained.

"A COMBINATION PAR EXCELLENCE."

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NO MORE BROKEN CASH BOXES.

FITTED TO THE POSITIVE PREPAYMENT METERS.

SAWER & PURVES,

MANCHESTER. Agent for Scotland: J. D. GIBSON, 2, Causeyside Street, Paisley. NOTTINGHAM.

Middlesex Gas-Meter Testing-Station.—The annual report of the work carried on at the Middlesex gas-meter testing-station has just been issued by Mr. W. E. Barney. During the twelve months, 82,184 meters were tested; the fees charged being £2492. The previous year's totals were 82,558 meters, and £2497 fees. Out of the total of 82,184 meters last year, 68,705 were tested at the minimum fee of 6d. There were 77,362 meters received from the makers; and of these 2005 were rejected. From gas companies and consumers 4822 were received; and of these 2979 were rejected. The number of meters received from gas companies and consumers shows an increase as compared with the previous year, when there were 4244 submitted. During the year, the total expenditure in connection with the upkeep of the station amounted to £1540.

Electrical Expectations Unfulfilled at Elland.—When returning thanks for his re-election for the fifth time to the office of Chairman of the Elland Urban District Council, Mr. H. Sharratt remarked that it was to be regretted that their expectations with regard to the electricity works had not been fulfilled. This, however, was entirely due to the lack of support from the ratepayers themselves. He appealed to his fellow townsmen to rally round, and to help to make the department a paying concern. It was a splendid installation, and well managed; but many more consumers were needed. If, through lack of support, it should have to be carried on at a loss, it might mean an addition to the rates. On the other hand, if it was made into a paying concern, it would be possible to keep the rates at their present level, and even some day to make a reduction.

Huddersfield Gas and Water Supply.—Alderman Woodhead, the Chairman of the Huddersfield Corporation Finance Committee, when moving the adoption of the estimates, as recommended by the various Committees, as a basis for the next borough rate at 7s. 6d. in the pound, informed the Council that the total amount of rate levied last year was £186,786. The actual sum collected was £173,152. The water-works revenue account showed a deficiency of £17,155, including £16,537 in respect of interest previously capitalized; and the Committee asked for an amount equal to a rate of 9d. in the pound. The water-works depreciation and contingencies account stood at £20,359. The revenue account of the gas-works fund showed a surplus on the year of £5884, as compared with a deficit of £5593 the previous year. There had been an increase in the gas-rental of £2117; while the working expenses had been reduced by £8789—principally in carbonization, purification, and distribution accounts. The Committee had decided to transfer £5718 in relief of the borough rates (equal to 3d. in the pound), and the balance of £166 to the depreciation and contingencies account, which now showed a credit balance of £31,740.

Cheltenham Electricity Supply.—At a Local Government Board inquiry with regard to an application by the Cheltenham Town Council for a further loan of £4000 for the purposes of the electricity undertaking, the Town Clerk said there was an unexpended balance of previous loans amounting to £18,078. The Inspector (Mr. H. R. Hooper) wanted to know how this balance was arrived at; but neither the Town Clerk nor the Electrical Engineer could give the details. The latter explained that he had only come on the scene five years ago, and that since then he had allocated the capital expenditure strictly to the purposes for which the loans in his time were obtained. In the earlier days this practice had not been followed, and it was impossible to say exactly how much of certain loans remained unexpended, though he could give approximate figures. The Inspector expressed himself as dissatisfied with this method of conducting the accounts of the concern. An electricity undertaking, he observed, was a matter of pounds, shillings, and pence, and the amount of the expenditure on the loans raised ought to be ascertainable within even a few pence. He did not know how they could proceed with the present application if they could not tell him how the unexpended balance was made up. Where was the necessity for borrowing another £4000 if they had an unexpended balance of £18,078 in hand? The Town Clerk replied that the money was not in hand. What he meant by "unexpended balance" was the aggregate amount of the money they had taken power to raise under different loans, but had not raised. The Inspector: Then these balances should have been cancelled. The Town Clerk replied that he was taking steps to get this done.

The Purity of the Truro Water Supply.—At the last meeting of the Truro Town Council, the Sanitary Committee presented a report in which they stated that they had considered an analysis by Mr. Kitto of a sample of the water supplied by the Truro Water Company, and recommended that it be forwarded, with copies of previous reports, to the Local Government Board, with a view to obtaining the co-operation of the Board in inducing the Company to ensure filtration of the water and the provision of a pure supply. Mr. Crews thought that before taking the action recommended by the Committee, they should ascertain from the Company what had been done in regard to the statement recently made that they were calling in the services of eminent experts. He understood the Council had expressed approval of the undertaking the Company gave; and unless they could prove that the Company had been dilatory in the matter, and were not doing what they promised to do, it would be better not to bring the matter into prominence, and raise anything like a scare or want of confidence in the purity of the water supplied to the city. Alderman Whitworth was of opinion that it would be premature to adopt the report and take the course suggested. He said they had an assurance from the Water Company that they had called in one of the greatest experts in reference to water supply with a view to remedying any defects which might exist. Little harm would be done by deferring the matter for a month. The Mayor (Mr. T. Beard) said the Committee felt it was necessary to get the Company to move quickly. Alderman Whitworth remarked that the Company were as anxious as the Council to get the water as pure as possible; but these things could not be done in a day or a week. Mr. J. J. Smith, the Chairman of the Water Committee, said the matter had been deferred many times, and the Committee thought it necessary, after the recent analyses, that something practical should be done, so that the city might be assured of being supplied with good water within a reasonably short period. The report was referred back to the Committee.

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New Season's Booklet now ready. A Post-card will bring you a Supply, Printed with your Name and Address.

Carron Company
INCORPORATED BY ROYAL CHARTER 1773

WORKS: CARRON, STIRLINGSHIRE.

SHOW-ROOMS:—LONDON (City)—15, Upper Thames Street, E.C.; (West End)—23, Princes Street, Cavendish Square, W.; LIVERPOOL—22 to 30, Red Cross Street; GLASGOW—125, Buchanan Street; EDINBURGH—114, George Street; MANCHESTER—24, Brazennose Street; BRISTOL—10, Victoria Street; NEWCASTLE-ON-TYNE—13, Prudhoe Street; BIRMINGHAM—218, 220, 222, Corporation Street; DUBLIN—44, Grafton Street.

CARRON COMPANY · ESTD. PERPETUA · FOUNDED 1759 · INCORPORATED BY ROYAL CHARTER 1773

South Luton District Gas Company.—The "Financial News" states that Mr. D. Hawkins, the Secretary of the South Luton District Gaslight and Coke Company, Limited, has issued a circular, dated April 25, convening an extraordinary general meeting of the shareholders to be held at Moorgate Station Chambers, this afternoon, when the following resolution will be submitted: "That Mr. Augustus Edwards, chartered accountant, of Capel House, New Broad Street, London, E.C., be, and is hereby, appointed Liquidator for the purpose of winding-up the Company."

Laindon Gas-Works Disposed Of.—As advertised, the freehold gas-works of the Laindon and District Gaslight, Coke, and Water Company, Limited, were, by order of the Court, put up to auction on the 12th ult. by Messrs. A. & W. Richards, at the Mart, Tokenhouse Yard; but the reserve figure was not at the time reached. The firm have, however, since succeeded in selling the works for £650. And these works form part of a gas and water concern on which the Eaton group in 1906 endeavoured to secure £12,000 of capital, of which the vendors (the Water-Works, Lighting, and Power Investment Corporation) were apparently to get £9500.

The Clerk to the Ripley Urban District Council has been instructed to make inquiries of other councils who have purchased gas-works, with a view to his own Council acquiring the local undertaking.

From the "Local Government Journal" we gather the information that Mr. C. E. Gravely, a blind councillor, has been elected on the Lighting Committee of the Clayton Parish Council, Sussex.

The Belfast Gas Committee have resolved that an engineering assistant be appointed to prepare the necessary plans and estimates in connection with the proposed new gas-works, and that the appointment be left in the hands of the Manager (Mr. R. Sharpe).

At a meeting of the Finance Committee of the Darwen Town Council, intimation was given by Councillor T. Duxbury that he would, when the matter came before the Council, oppose the proposal to take profits from the Gas Department for the relief of the rates.

At an inquest at Shipley, some complaint was made as to the dangerous position of gas-meters in the district. The inquiry had reference to the death of John Trotter, aged 74 years, a wool scourer, of Saltaire, who died from injuries received from a fall sustained while in the act of putting a copper in the penny-in-the-slot meter, which, it was stated, was situated over the kitchen sink. In returning a verdict of "Accidental death," the Jury requested the Coroner to communicate with the District Council in reference to the way that meters are fixed in the district.

Messrs. Ashmore, Benson, Pease, and Co., Limited, of Stockton-on-Tees, have just secured orders for Livesey washers for Bahia, Colombo (2), Sutton-in-Ashfield, and Japan (2); stills for Cologne and Sunderland; heater for Newcastle; annular condensers, exhauster, pumps, and rotary washer-scrubber for Sutton-in-Ashfield; two purifiers for Japan; roofs for the Cardiff Gas Company; a retort-bench and fittings, and also retort-house and coal-store roofs, for Frizington; a spiral-guided gasholder and steel tank for Carfin; an additional lift 98 feet diameter to a two-lift gasholder in a steel tank at Morecambe; a rotary washer-scrubber for Seaham; a condenser and tar-extractor for the Luton Gas Company, and several other important contracts in other districts.

At the meeting of the Chelsea Borough Council last Wednesday, the Works Committee reported that in February last it was decided to terminate the contract with Messrs. D. Anderson and Co., Limited, for the maintenance of Scott-Snell lamps, and to substitute others therefor. In order to test the merits of various types of burners, experiments had since been carried out in various parts of the borough; and as a result of these experiments, the Committee had come to the conclusion that the "Daco" lamps were most suitable. The cost of gas for a four-light "Daco" lamp was £5 18s. 4d. a year, as against £6 10s. 2d. for a Scott-Snell lamp. It was decided that the 33 Scott-Snell lamps be replaced by "Daco" lights, and that the lanterns be adapted to take the new burners, at a cost not exceeding £3 10s. each. It was left to a Committee and the Borough Surveyor to determine finally as to whether four or a less number of gas-burners should be placed in each lamp.

The "Beautiful Sheffield League," at their inaugural meeting, were addressed at length by Mr. Edward Carpenter, who expressed the opinion that the whole of the existing "smoke plague" was unnecessary. "It has," he remarked, "been now proved that smoke might be completely abolished with economy and financial advantage, as well as with enormous gain to our lives and health. The Smoke Abatement Exhibition held last year, and the addresses given in connection with it by authorities like Sir Oliver Lodge, show this. Mechanical stokers of various forms have made the banishment of smoke from boiler furnaces easy. The use of gas instead of green coal in connection with heating furnaces of various kinds is being more and more favoured; and it is only, I suppose, the initial expense of converting furnaces to the new patterns which delays its more rapid adoption. Electric power and electric heating (which, of course, secure absolutely clean atmospheric conditions) are coming more and more into use; the economic transmission of electric energy over long distances is now an accomplished fact; and it is, I imagine, only a question of time before electric generators will be placed at the very mouths of the coal-pits, to convert the coal at once into power without any wasteful carriage, and so enable the latter to be distributed over a large city like Sheffield at a low cost, and with great economy. All these things are actually proved results of modern science and invention; and it is only the inertia of old habits and institutions which stands in the way of their adoption." He urged people at once to improve the forms and fuel of their stoves in such a way as to obviate the evil of house-smoke. It was much to be hoped that before long "naked gas" would cease to be used for lighting purposes, and that cheap heating gas would be provided instead, which would put excellent gas-fires and cooking-stoves within reach of everybody. Much might be done by encouraging this idea.

PARKINSON'S

HOT CLOSET

AND

PLATE WARMER

FOR FITTING ABOVE COOKER.

Thoroughly heated by the heat after being used in oven, also by means of the hot-plate burners.

Substantially constructed throughout, and fitted with Fall Door, which is very convenient for use as a rest for plates.

Plates are evenly warmed ready for use, and do not get discoloured or moist from condensation.

See special list for other new designs in Plate Racks, &c.

THE

PARKINSON STOVE CO., LTD.

(Incorporating Maughan's Patent Geyser Co.),

Stour St., Spring Hill, BIRMINGHAM. & 129, High Holborn, LONDON.

The Corporation of Oldham have been fined 20s. and costs in each of two cases for permitting the emission of black smoke from their Greenhill electricity works. Mr. Newington, the Electrical Engineer, explained that experiments were being made with smoke consumers at the Greenhill station. Before any appliance was fixed to the boilers, they wanted to be quite sure they had the most effective. To fix the one they were trying to all the boilers would cost about £2500; so that they did not want to make any mistake. He thought they would succeed in doing away with any smoke nuisance. Indeed, they had not been great sinners in the past. In the present case, he pointed out that the observation was taken about sunset. A large amount of steam was turned out of the chimney; and he defied any man in certain lights to tell the difference between steam and smoke. He did not deny that black smoke was emitted from the chimney at times; but they also turned out a lot of steam.

The Weights and Measures Committee of the Hertfordshire County Council have had under consideration a letter from the First Garden City, Limited, making application for the appointment by the County Council of an Inspector of Gas-Meters for the parish of Letchworth, under the Sale of Gas Act. The writers said they were in negotiation with a firm of gas-meter manufacturers, who might establish their works there instead of in London; and the question of stamping had arisen. The Committee have been in negotiation with the First Garden City, with the result that the Company have decided to enter into an agreement with the County Council upon the following terms: (1) The Company, at their own expense, to provide a fit and proper place, to be approved in writing by the County Council, for the sole use of the County Council and their Inspectors, for the deposit of duly verified and stamped copies of the models of gasholders mentioned in the Act, with proper balances, indices, and other apparatus for testing the measurement and registration of gas-meters, and with stamps for stamping gas-meters, and also a fit and proper place for the examination, testing, and stamping of such meters, and to provide the money required for providing all such copies of models, apparatus, and stamps. (2) When the above places, articles, and things have been provided, the County Council to appoint a duly qualified person to act as Inspector of Gas-Meters for the parish of Letchworth, or for a district including that parish. (3) The Company to keep the above places, articles, and things in good order and condition, and to provide the Inspector with such workmen and other assistants as he may reasonably require to enable him to perform his duties with regard to the parish of Letchworth. (4) If in any year of office of the Inspector the fees received in respect of the parish of Letchworth are not sufficient to provide the money required for payment of the expenses of the County Council, the Company to pay the amount of such deficiency, not exceeding the sum of £50 in any one year—such expenses to include the whole of the remuneration and expenses of the Inspector attributable to the execution of the Act in the parish of Letchworth.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

GAS LIGHTING EXPERT. No. 945. c/o Rudolf Mosse, Hamburg.
WORKING MANAGER. Cranleigh Gas Company. Applications by May 9.
REPRESENTATIVE (GAS STOVE TRADE). No. 5231.
GAS FITTER, &c. Bognor Gas Company.

Plant, &c. (Second Hand), for Sale.

EXHAUSTER, RETORT MOUTHPIECES, &c. Grays and Tilbury Gas Company.
PUMP (AIR OR GAS). Ordnance Office, Harwich.
TANK WAGGONS. Watson, Sowter, and Co., Derby.
WASHER, &c. Whitehouse's Executors, Ilkeston.

Plant, &c. (Second-Hand), Wanted.

STREET LAMPS. Alford Gas Works.

Patent for Disposal, &c.

LIGHTING CONTROLLERS, &c. L. Duvinage, Brussels.

Stocks and Shares.

BARNET GAS COMPANY. May 24.
DORKING GAS COMPANY. May 24.
LEA BRIDGE GAS COMPANY. May 10.

TENDERS FOR

Benzol Wanted. No. 5232.

FOR EXPORT TO THE CONTINENT. No 5225.

Coal and Cannel.

BARROW-IN-FURNESS CORPORATION. Tenders by May 24.
BIRKENHEAD CORPORATION. Tenders by May 12.
CAPE TOWN GAS COMPANY. Tenders by May 20.
CUPAR GAS COMPANY. Tenders by May 9.
ELSECAR, WENTWORTH, AND HOYLAND GAS COMPANY. Tenders by May 11.

Coal and Cannel (*continued*).

HEYWOOD GAS DEPARTMENT. Tenders by May 12.
LINCOLN GAS DEPARTMENT. Tenders by May 20.
PAIGNTON GAS COMPANY. Tenders by May 7.
RAMSGATE GAS AND WATER DEPARTMENT. Tenders by May 9.
SOUTH STAFFORDSHIRE WATER COMPANY. Tenders by May 18.

Purifiers, &c.

CHESTER GAS COMPANY. Tenders by May 12.

Steel and Cast-Iron Work for Roof.

CHESTER GAS COMPANY. Tenders by May 12.

Tar and Liquor.

EASTBOURNE GAS COMPANY. Tenders by May 7.
MACCLESFIELD GAS DEPARTMENT. Tenders by May 14.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 298.

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,474,000	Stk.	Apl 1	5	Alliance & Dublin Ord.	82–84	–1	5 19 1
310,000	Stk.	Jan. 13	4	Do. 4 p.c. Deb.	100–102	..	3 18 5
200,000	5	Oct. 28	7†	Bombay, Ltd.	6⅞–6⅞	..	5 5 8
40,000	5	,,	5†	Do. New, £4 paid	5–5¼	..	5 6 8
50,000	10	Feb. 25	15	Bourne- mouth Gas & Water Pref. 6 p.c.	29–30	..	5 0 0
311,810	10	,,	7		16¼–16⅝	..	4 3 7
75,000	10	,,	6		15–15⅜	..	3 17 5
380,000	Stk.	,,	12½	Brentford Consolidated	251–254	..	4 18 5
300,000	,,		9½	Do. New	188–190	..	5 0 0
50,000	,,	Aug. 12	5	Do. 5 p.c. Pref.	120–122	..	4 2 0
206,250	,,	Dec. 29	4	Do. 4 p.c. Deb.	101–103	..	3 17 8
220,000	Stk.	Mar. 16	11	Brighton & Hove Orig.	213–216	..	5 1 10
246,320	,,	,,	8	Do. A Ord. Stk.	152–155	..	5 3 3
460,000	20	Apl. 1	10⅝	British	44–45	..	4 14 8
109,000	Stk.	Feb. 25	6	Bromley, A 5 p.c.	118–120	..	5 0 0
165,700	,,	,,	4½	Do. B 3½ p.c.	88–90	..	5 0 0
82,278	,,	,,	5⅝	Do. C 5 p.c.	105–107	..	5 2 10
55,000	,,	Dec. 29	3⅛	Do. 3½ p.c. Deb.	87–89	..	3 18 8
500,000	10	Oct. 14	7	Buenos Ayres (New) Ltd.	—	..	—
250,000	Stk.	Dec. 29	4	Do. 4 p.c. Deb.	98–100	..	4 0 0
100,000	10	—	—	Cape Town & Dis., Ltd.	4–5	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	6–7	..	—
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	49½–50½	..	5 18 10
100,000	Stk.	Dec. 29	4½	Do. 4½ p.c. Deb. Stk.	86–88	..	5 2 3
157,150	Stk.	Feb. 25	5	Chester 5 p.c. Ord.	109–111	+1	4 10 1
1,513,280	Stk.	Feb. 25	5⅛	Commercial 4 p.c. Stk.	106–108	..	4 16 4
560,000	,,	,,	5	Do. 3½ p.c. do.	103–105	..	4 15 3
475,000	,,	Dec. 29	3	Do. 3 p.c. Deb. Stk.	81–83	..	3 12 3
800 000	Stk.	Dec. 10	5	Continental Union, Ltd.	98–100	..	5 0 0
200,000	,,	,,	7	Do. 7 p.c. Pref.	138–140	..	5 0 0
492,270	Stk.	—	5½	Derby Con. Stk.	121–123	..	4 9 5
55,000	,,	—	4	Do. Deb. Stk.	104–105	..	3 16 2
148,995	,,	Apl. 1	5	East Hull 5 p.c. Ord.	96–98	..	5 2 0
486,090	10	Jan. 27	12	European, Ltd.	24½–24⅝	..	4 17 0
354,060	10	,,	12	Do. £7 10s. paid.	18½–18⅝	..	4 16 0
16,198,670	Stk.	Feb. 10	4⅝	Gas light and Coke 4 p.c. Ord.	103⅜–104⅛	..	4 9 3
2,600,000	,,	,,	3½		88–90	..	3 17 9
4,062,235	,,	,,	4		104–106	..	3 15 6
4,531,706	,,	Dec. 29	3		81–83	..	3 12 3
258,740	Stk.	Mar. 16	5	Hastings & St. L. 3½ p.c.	93–95	..	5 5 3
82,500	,,	,,	6½	Do. do. 5 p.c.	117–119	..	5 9 3
70,000	10	Apl. 29	11	Hongkong & China, Ltd.	17–17⅛*	..	6 5 9
131,000	Stk.	Mar. 16	7	Ilford A and C	145–147	..	4 15 3
65,780	,,	,,	5⅜	Do. B	108–110	..	5 0 0
65,500	,,	Dec. 29	4	Do. 4 p.c. Deb.	100–102	..	3 18 5⅛

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
4,940,000	Stk.	Nov. 11	8	Imperial Continental	181–183	..	4 7 5
1,235,000	Stk.	Feb 10	3½	Do. 3½ p.c. Deb. Red.	94–96	..	3 12 11
195,242	Stk.	Mar. 16	6	Lea Bridge Ord. 5 p.c.	122–124	..	4 16 9
561,000	Stk.	Feb. 25	10	Liverpool United A.	222–224	..	4 9 3
718,100	,,	,,	7	Do. B	163½–165½	..	4 4 7
306,083	,,	Dec. 29	4	Do. Deb. Stk.	103–105	..	3 16 2
75,000	5	Nov. 26	6	Malta & Mediterranean.	4¾–5	..	6 0 0
560,000	100	Apl. 1	5	Met. of 5 p.c. Deb.	100–102	..	4 18 0
250,000	100		4½	Melbourne 4½ p.c. Deb.	100–102	..	4 8 3
541,920	20	Nov. 11	3½	Monte Video, Ltd.	12⅞–13½	..	5 5 8
1,775,892	Stk.	Feb. 25	4½	Newc'tle & G'tesh'd Con	104–106	+½	4 2 7
529,435	Stk.	Dec. 29	3½	Do. 3½ p.c. Deb.	91–93	..	3 15 3
55,940	10	Feb. 25	7	North Middlesex 7 p.c.	133–133	..	5 1 10
300,000	Stk.	Apl. 29	8	Oriental, Ltd.	138–140*	..	5 14 4
60,000	5	Apl. 1	8	Ottoman, Ltd.	6–6½	..	6 8 0
31,800	53	Feb. 25	13	Portsea Island A.	134–136	..	5 1 0
60,000	50	,,	13	Do. B.	126–128	..	5 1 7
100,000	50	,,	12	Do. C.	119–121	..	4 19 2
114,800	50	,,	10	Do. D and E.	100–102	..	4 18 0
398,490	5	Apl. 29	7	Primitiva Ord.	7⅞–7⅞*	..	4 10 4
796,980	5	Jan. 27	5	Do. 5 p.c. Pref.	5⅛–5⅛	..	4 9 11
488,900	100	Dec. 1	4	Do. 4 p.c. Deb.	99–101	..	3 19 3
1,000,000	10	Oct. 14	8	River Plate Ord.	—	..	—
312,650	Stk.	Dec. 29	4	Do. 4 p.c. Deb.	99–101	..	3 19 3
250,000	10	Apl. 1	9	San Paulo, Ltd.	15⅛–15⅝	..	5 14 3
62,500	10	,,	6	Do. 6 p.c. Pref.	11⅜–12⅛	..	4 18 0
125,000	50	Jan. 3	5	Do. 5 p.c. Deb.	5⅛–5⅛	..	4 17 1
135,000	Stk.	Mch. 16	10	Sheffield A	232–234	..	4 5 5
209,984	,,		10	Do. B	232–234	..	4 5 5
523,500	,,		10	Do. C	232–234	..	4 5 5
70,000	10	Oct. 14	10	South African	12⅛–12⅝	..	7 16 11
6,429,895	Stk.	Feb. 10	5/9/4	South Met., 4 p.c. Ord.	120–122	..	4 9 7
1,895,445	,,	Jan. 13	3	Do. 3 p.c. Deb.	81–83	..	3 12 3
209,820	Stk.	Mar. 16	8	South Shields Con. Stk.	157–158	..	5 1 3
605,000	Stk.	Feb. 25	5⅝	S'th Suburb'n Ord. 5 p.c.	121–123	..	4 12 0
60,000	,,	,,	5	Do. 5 p.c. Pref.	121–123	..	4 1 4
117,058	,,	Jan. 13	5	Do. 5 p.c. Deb. Stk.	122–124	..	4 0 8
502,310	Stk.	Nov. 11	5	Southampton Ord.	110–112	..	4 9 3
120,000	Stk.	Feb. 10	6⅛	Tottenham A 5 p.c.	133–135	..	5 1 9
453,940	,,	,,	5⅝	and B 3½ p.c.	113–115	..	4 13 6
149,470	,,	Dec. 29	4	Edmonton 4 p.c. Deb.	19–101	..	3 19 3
182,380	10	Dec. 29	8	Tuscan, Ltd.	9½–9⅝	..	8 4 2
149,900	10	Jan. 3	5	Do. 5 p.c. Deb. Red.	99–101	..	4 19 0
236,476	Stk.	Feb. 25	5	Tynemouth, 5 p c max.	113–115	..	4 0 11
255,636	Stk.	Feb. 25	6⅝	Wandsworth B 3½ p.c.	139–141	..	4 14 0
79,416	,,	Dec. 29	3	3 p.c. Deb. Stk.	74–76	..	3 18 11

Prices marked * are "Ex div." † Next dividend will be at this rate.

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Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

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Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

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O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 189, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

BROTHERTON & CO., LIMITED.
Offices: City Chambers, LEEDS.
Correspondence invited.

LUX'S GAS PURIFYING MASS.
See Advertisement on p. 337.
FRIEDRICH LUX, LUDWIGSHAFEN-AM-RHEIN.

R. & G. HISLOP,
GAS ENGINEERS, RETORT BUILDERS, CONTRACTORS, &c.
RETORT SETTINGS, COAL-TESTING PLANT, BOILER FIRING.
UNDERWOOD HOUSE, PAISLEY.

D. ANDERSON AND COMPANY,
GAS LIGHTING ENGINEERS AND CONTRACTORS,
18 & 20, FARRINGDON ROAD, LONDON, E.C.
Telegrams: "DACOLIGHT LONDON." Telephone: 2896 HOLBORN.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.
BROTHERTON AND CO., LTD., Chemical Manufacturers, Works: BIRMINGHAM, LEEDS, SUNDERLAND, and WAKEFIELD.

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WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
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BENZOL
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CARBURINE FOR GAS ENRICHING.
ALSO
THE MAXIM PATENT CARBURETTOR.
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LONDON, E.C.
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BROTHERTON AND CO., LTD., Ammonia Distillers. Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, SUNDERLAND, AND WAKEFIELD.

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SIMULTANEOUS Discharging-Charger.
The one Machine which Discharges and Charges at One Stroke.
See Advertisement, April 12, p. IV. of Centre.
ALDRIDGE AND RANKEN,
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Telegrams: "MOTORPATHY, LONDON." Telephone: 5118 WESTMINSTER.

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BALE'S FIRE CEMENT.
PAINT FOR GAS-WORKS.
BALE & CHURCH,
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SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
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with which is amalgamated WM. PEARCE & SONS, LTD.
36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
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MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 & 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

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Consumers in any form are invited to correspond with CHANCE AND HUNT, LTD., Chemical Manufacturers, OLDBURY, WORCS.

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PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no back Pressure.
The Cheapest in the Market.
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TAR WANTED.
Telephone: Central Manchester, 7002.
Telegrams: "UPRIGHT."
Apply, THOMAS HORROCKS,
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Pitch, Creosote, Brick and Fuel Oils, Benzol, Solvent Naphtha, Carbolic, Sulphate of Ammonia.

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AUTOMATIC GAS FLASHING SIGNS.
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Telegrams: "Gasoso London." Telephone: 14 Hammersmith.

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It is also used for the enrichment of Gas.
Manufactured and supplied by C. Bourne, West Moor Chemical Works, Killingworth, or through his Agent, F. J. Nicol, Pilgrim House, Newcastle-on-Tyne.
Telegrams: "Doric," Newcastle-on-Tyne. National Telephone No. 2497.

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SPECIALLY prepared for Sulphate of AMMONIA Makers by
CHANCE AND HUNT, LIMITED,
Works: Oldbury, Wednesbury, and Stafford.
Address Correspondence and Inquiries to Oldbury, Worcs.
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GAS TAR wanted,
Brotherton and Co., Ltd., Tar Distillers.
Works: Birmingham, Glasgow, Leeds, Liverpool, Sunderland, and Wakefield.

GAS OILS.
MEADE-KING, ROBINSON, & CO. Represent the Strongest Independent Refineries in America; also Petroleum Spirit for Gas Enrichment. 18, Exchange Street, Manchester, and 11, Old Hall Street, Liverpool.

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THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, April 5, p. 8.

GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Specialty of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the *best*. Satisfaction Guaranteed.

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Purification Plant.
Results Guaranteed. No Working Costs.
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LITLE'S PATENT INVERTED GAS-BURNER.
THERMOSTATIC regulation of Air and Gas prevents Flashbacks and Carbonization, and insures highest Candle-Power efficiency.
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GAS PLANT for Sale—We can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
Firth Blakeley, Sons, and Company, Limited, Thornhill, Dewsbury.

SATURATORS made or Repaired.
Reasonable Terms (workmanship guaranteed) by a 30 Years' Saturator Maker (Labour and Plant only), at per Hour or Contract. Saturators improved. Perfect Mixing and Noiseless.
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APPOINTMENTS.—Ambitious Men of Parts invited to write—
HERBERT GREATOREX,
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BEECHWOOD, MATLOCK.
Specimen of many results:—
"Have got the job. Quite a good start. To you the credit is due, and I think your fee the best Investment I ever made."
BUSINESS IS REVIVING. WRITE NOW.

THE Directors of the Rainhill Gas and Water Company THANK the numerous APPLICANTS who Applied for the Position of MANAGER to the Company, in reply to the Advertisement which appeared in the "Journal," and inform them that the APPOINTMENT HAS BEEN MADE.
Fredk. Pritchard, Secretary.

GAS STOVE TRADE.
EXPERIENCED Representative on Commission wanted for Eastern Counties and the South of England.
Apply, by letter, to No. 5231, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, on July 1, by the Cranleigh Gas and Coke Company, Limited, an Experienced WORKING MANAGER. Make Nine Millions. Wages £2 weekly. Cottage on Works, Fuel and Light.
Application, by letter, marked "Manager," to be made not later than May 9.
H. J. Hayman, Secretary.

GERMAN Firm, making a speciality of the Construction of RETORT FURNACES, and Possessing own Manufactory of Fire-Clay Bricks and Retorts, want a GAS LIGHTING EXPERT for Confidential Position to introduce its economically working Furnace Constructions and well-proved Retort and Fire-Clay Materials.
Address "F.B.T." 945, care of Rudolf Mosse, Hamburg, Germany.

WANTED, by the Bognor (Sussex) Gas Company, a Good, All-round GAS-FITTER. Must be used to Iron, Lead, and Compo. and Capable of Laying Services and House Installations Complete; also to Canvass and Advise Consumers respecting the Latest Types of Fittings and Appliances.
Apply, stating Age, Experience, and Wages required, together with *copies* of not more than Three Testimonials, to the Manager, Bognor Gas-Works, Argyle Road, Bognor, Sussex.

WANTED—Fifty Good, Second-Hand, STREET LAMPS. Send Price and Particulars to the Manager, Gas-Works, Alford, Lincs.

100 TONS of Crude Benzol wanted f.m.w. at once.
Quotations to No. 5232, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

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TANK Waggons for Sale, 8 to 12 Tons, for Tar, Liquor, &c.
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FOR SALE—A Gas Exhauster by Alfred Williams and Co., London. Capacity 15,000 Cubic Feet per Hour. In good Condition. Also 19 RETORT MOUTHPIECES and LIDS, 21 in. by 15 in. Cheap.
For further Particulars, Apply to H. C. Borradaile, Secretary, Grays and Tilbury Gas Company, Grays.

GASHOLDERS—Splendid 45 feet dia- meter and New STEEL TANK, fixed Complete to Plan and Specification; also 14 feet and 16 feet Diameter GASHOLDERS, with STEEL TANKS. Can be seen temporarily erected. Re-erected Cheap for immediate Sale.
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FOR SALE.
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THE Pump, which is designed to be driven by Engine Power, is intended for Charging Reservoirs for Hydro-Pneumatic Gun Mountings with Compressed Air. It can also be used for Charging Balloon Reservoirs with Gas.
Application for Tender Forms for the Purchase of the above can be obtained from the Chief Ordnance Officer, Colchester.
The Pump can be seen at the Ordnance Office, Harwich.

EASTBOURNE GAS COMPANY.
TENDERS are invited for the Purchase of the Surplus TAR for Sale for the Twelve Months commencing on July 1, next, delivered into Contractor's Railway Tanks at the Gas-Works.
Terms, Cash Monthly.
Tenders, endorsed "Tar," should be addressed to the Chairman, Eastbourne Gas Company, not later than May 7.
James S. Garrard, Secretary.

CUPAR GAS COMPANY, LIMITED.
TENDERS FOR COAL.

THE Directors of the Cupar Gas Com- pany, Limited, invite TENDERS for the Supply of about 2700 Tons of Best Quality GAS COAL, NUTS, and CANNEL, delivered in Waggons at Cupar Station, in such Quantities as may be required till the 31st of May, 1911.
Sealed Tenders, addressed to the undersigned, and endorsed "Tender for Coal," to be sent in not later than Monday, the 9th day of May.
The Directors do not bind themselves to accept the lowest or any Offer.
J. Macpherson, Manager and Secretary.
Gas-Works, Cupar, Fife.

LINCOLN CORPORATION.
(Gas Department.)
TENDERS FOR COAL.

THE Gas Committee of the Lincoln Cor- poration invite TENDERS for the Supply of 30,000 Tons of Screened or Unscreened GAS COALS and NUTS, to be delivered during a period commencing the 1st of July, 1910, and terminating the 30th of June, 1911.
Further Particulars and Forms of Tender may be obtained from the undersigned.
Sealed and endorsed Tenders, addressed to the Chairman of the Gas Committee, must be delivered on or before the 20th of May next.
The Committee do not bind themselves to accept the lowest or any Tender.
Jno. Carter, Manager.
Gas Offices, Lincoln,
April 22, 1910.

PAIGNTON GAS COMPANY.
TENDERS FOR GAS COAL.

THE Directors of the Paignton Gas Company are prepared to receive TENDERS for the Supply of 5000 Tons of best approved GAS COALS, to be delivered in such Quantities and at such times as may be required, and to weigh 20 cwt. to the Ton over the Gas Company's Weigh Bridge.
Tenders to be accompanied by Practical Working Analysis, stating the Price of Coal delivered at Paignton Station, Great Western Railway, free of all Charges.
Forms of Tender are not supplied.
The Directors do not bind themselves to accept the lowest or any Tender.
Further Particulars may be obtained from Mr. C. G. Dawson only.
Sealed Tenders, endorsed "Tender for Coal," specifying the description and quality of Coal, to be sent on or before the 7th day of May next addressed to the undersigned at the Gas Offices, 1a, Victoria Street, Paignton.
F. W. Puddicombe, Secretary.
Paignton, April 14, 1910.

CHESTER UNITED GAS COMPANY.
TENDERS FOR PURIFIERS AND ROOF.

THE Directors of the above Company invite TENDERS for the REMOVAL and RE-ERECTION of Two existing PURIFIERS, 24 feet by 22 feet by 5 feet deep, and Alterations to Connections, the SUPPLY and ERECTION of Two New PURIFIERS, 24 feet by 22 feet by 5 feet deep, with Connections and Weck Centre Valve to work the Set of Four, Two overhead Travelling Cranes, and about 100 Tons of STEEL and CAST-IRON WORK in Roof over Purifiers and Oxide Sheds at the Roodee Gas-Works, Chester.
Drawings, Specification, Bill of Quantities, and Form of Tender may be obtained on Application to the Manager, Roodee Gas-Works, on payment of One Guinea, which will be returned on receipt of a *bonâ-fide* Tender and Particulars supplied.
Tenders to be delivered (sealed) on or before Nine a.m. on Thursday, the 12th day of May, 1910, addressed to the undersigned and endorsed "Tender for Purifiers and Roofs."
The Directors do not bind themselves to accept the lowest or any Tender.
Fred. A. Pye, Secretary and General Manager.
Gas Company's Offices,
Cuppin Street, Chester,
April 23, 1910.

TO COLLIERY PROPRIETORS AND OTHERS.
THE Corporation of Birkenhead are prepared to receive TENDERS for the Supply of Screened COAL, Through and Through COAL NUTS, and CANNEL, for Gas-Making purposes, for a period of Twelve Months, commencing from the 1st of July, 1910.
Form of Tender, together with any further Information, may be obtained from Mr. T. O. Paterson, C.E., Gas Engineer, Gas-Works, Birkenhead.
Tenders (accompanied by copy of recent Analysis), stating the Price per Ton delivered to the Gas-Works Railway Siding, must be sent in to me, sealed and endorsed "Tender for Gas-Works Coal," not later than Five o'clock in the afternoon of Thursday, the 12th of May, 1910.
All Deliveries to be made from time to time according to the requirements of the Engineer.
The parties whose Tender may be accepted will be required to enter into a Contract containing a clause as to the payment of the Rate of Wages and the Observance of the Hours of Labour recognized and agreed upon between the Trades Unions and the Employers in Birkenhead or in the locality in which the work for carrying out the Contract is executed, as the case may be.
The Corporation do not bind themselves to accept the lowest or any Tender.
By order,
James Fearnley, Town Clerk.
Town Hall, Birkenhead,
April 30, 1910.

BENZOL.

To Collieries having Bye-Product Recovery Coke-Ovens, or to Tar-Works capable of delivering for Export to the Continent 3000 Tons per Annum (more or less) of 90 per cent. Commercial Benzol under Contract covering a number of Years.

Offers are invited from Firms only who are *bonâ-fide* in a Position to enter into a Contract for the above quantity.

Address, in first instance, No. 5226, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

BOROUGH OF HEYWOOD.

THE Gas Committee invite Tenders for the Supply of 12,000 Tons of COAL and 500 Tons of CANNEL.

Specification and Form of Tender may be obtained upon Application to Mr. W. Whatmough, Gas Manager.

Sealed Tenders, endorsed "Coal," to be sent to me not later than Thursday, May 12, 1910.

By order,
GEO. G. BOUCHIER,
Town Clerk.

Municipal Buildings, Heywood,
April 20, 1910.

THE Directors of the Elsecar, Went- worth, and Hoyland Gas Company invite TENDERS for the Supply of 3000 Tons (more or less) of Best Screened GAS COAL or NUTS, to be delivered at Elsecar Station (Great Central Railway) during the Year ending the 30th of June 1911, at such times and in such Quantities as required by the Manager.

Tenders to be delivered by the 11th of May, addressed to the Chairman, 94, King Street, Hoyland, endorsed "Tender for Coal."

ALBERT F. HALL,
Secretary.

Hoyland, near Barnsley,
April 23, 1910.

THE Cape Town and District Gaslight and Coke Company, Limited, will be pleased to receive TENDERS for the Supply of 10,000 to 15,000 Tons of GAS COAL. Shipment to be made in lots of 2500 to 3500 Tons at intervals of Two to Four Months, at their option, to reckon from the 1st of July next. Delivery to be made c.i.f. Cape Town.

Tenders to be sealed and marked "Coal," and to be addressed to the Cape Town and District Gaslight and Coke Company, Limited. Egypt House, New Broad Street, E.C., and should reach the Company's Office not later than May 20 next.

Each Tender should be accompanied by an Analysis of the Coal offered.

BOROUGH OF MACCLESFIELD.

TENDERS FOR TAR AND AMMONIACAL LIQUOR.

THE Gas Committee are prepared to re- ceive TENDERS for the Purchase of the Surplus TAR and AMMONIACAL LIQUOR made at their works during the Twelve Months commencing the 1st of July, 1910.

For Conditions, Apply to Mr. Newbigging, Engineer, Gas-Works, Macclesfield.

Tenders for the Tar or Liquor separately to be sent in not later than Saturday, the 14th day of May, 1910, addressed to the Chairman of the Gas Committee, Town Hall, Macclesfield, and endorsed "Tender for Tar, &c."

The Committee reserve to themselves the right of accepting any Tender for the Tar or Liquor separately.

The highest or any Tender not necessarily accepted.

By order,
F. R. OLDFIELD,
Town Clerk.

April 26, 1910.

RAMSGATE CORPORATION.

(GAS AND WATER DEPARTMENT.)

THE Gas and Water Committee invite TENDERS for 22 000, 44,000, and 66,000 Tons (One, Two, and Three Years' Supply respectively) of Best Quality Soft Caking and Gas Producing Screened Durham or other COAL, delivered free into Carts on the Quay at Ramsgate Harbour, or free into the Stores at the Gas-Works.

Deliveries to be in Monthly Quantities, as set forth in the printed Particulars, and are to commence as from Aug. 1, 1910. A distinct Price to be named for each quantity.

Tenders to be sent in not later than Noon on Monday, May 9, 1910, addressed to the Chairman of the Gas and Water Committee, Gas and Water Offices, Boundary Road, Ramsgate, endorsed "Coals."

The Committee do not bind themselves to accept the lowest or any Tender.

Full Particulars and Form of Tender on Application to the undersigned.

WM. THOMSON,
Engineer and Manager.

Gas and Water Offices,
Ramsgate, April, 1910.

BOROUGH OF BARROW-IN-FURNESS.

THE Corporation are prepared to re- ceive alternative TENDERS, on Forms to be obtained at the Office of the Gas and Water Manager, for the Supply of Screened GAS COAL and CANNEL for One, Two, or Three Years from the 1st of July next.

Tenders, addressed to the Chairman of the Gas and Water Committee, and endorsed "Tender for Coal," to be delivered at the Town Clerk's Office, not later than Twelve O'clock noon on Tuesday the 24th of May, 1910.

The lowest or any Tender not necessarily accepted.

By order,
L. HEWLETT,
Town Clerk.

Town Hall, Barrow-in-Furness.

SOUTH STAFFORDSHIRE WATER-WORKS COMPANY.

TENDER FOR ENGINE SLACK.

THE Company are prepared to receive TENDERS for the Supply of ENGINE SLACK, at their various Pumping-Stations, for Nine Months from the 1st of July, 1910.

Forms of Tender, giving Particulars as to the Quantity of Slack to be delivered at the various Stations, can be obtained on Application to me.

Tenders, made out on the Forms provided, and endorsed "Tenders for Slack," must reach me at latest by Twelve Noon on Wednesday, May 18, 1910.

The Company do not bind themselves to accept the lowest or any Tender.

H. ASHTON HILL, M.Inst.C.E.,
Engineer.

Paradise Street, Birmingham.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to MESSRS. A. & W. RICHARDS, at 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
LEA BRIDGE DISTRICT GAS COMPANY.

ISSUE OF £14,000 NEW CAPITAL COMPRISING:
£4000 Four per Cent. Perpetual Debenture Stock,
£5000 Five per Cent. Preference Stock,
£5000 Consolidated Ordinary Stock.

MESSRS A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, May 10, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
DORKING GAS COMPANY.

NEW ISSUE OF £4000 FIVE PER CENT. PERPETUAL DEBENTURE STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, May 24, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
BARNET DISTRICT GAS AND WATER COMPANY.

NEW ISSUE OF £2200 "D" CAPITAL GAS STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, May 24, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

THE Proprietor of the British Patent No. 7176, of 1907, for "IMPROVEMENTS IN APPARATUS FOR CONTROLLING THE IGNITION OF GAS BURNERS," desires to SELL his Patent or to grant LICENCES thereof.

All Communications should be addressed in the first instance, to L. DUVINAGE, Patent Agent, 10, Avenue des Nerviens, BRUSSELS.

Just Published. Price 1s. *net.*

THE SALE OF GAS APPARATUS

BY

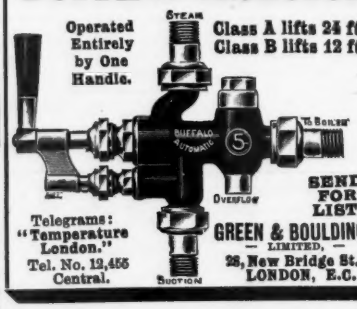
J. PATER WIATT.

Author of "Chemistry in Physics," "Internal Combustion Engines," &c., &c.

London: WALTER KING, 11, Bolt Court, Fleet St., E.C.

'BUFFALO' INJECTOR

Operated Entirely by One Handle.



Class A lifts 24 ft.
Class B lifts 12 ft.

SEND FOR LIST.

Telegrams: "Temperature London." Tel. No. 12,455 Central.

GREEN & BOULDING, — LIMITED, — 28, New Bridge St., LONDON, E.C.

JOHN HALL & CO. OF STOURBRIDGE,
LIMITED,
STOURBRIDGE,
Manufacturers of
FIRE-BRICKS, LUMPS, TILES,
GAS RETORTS,
And every description of Fire-Clay Goods.

RETORTS CAREFULLY PACKED FOR SHIPMENT.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

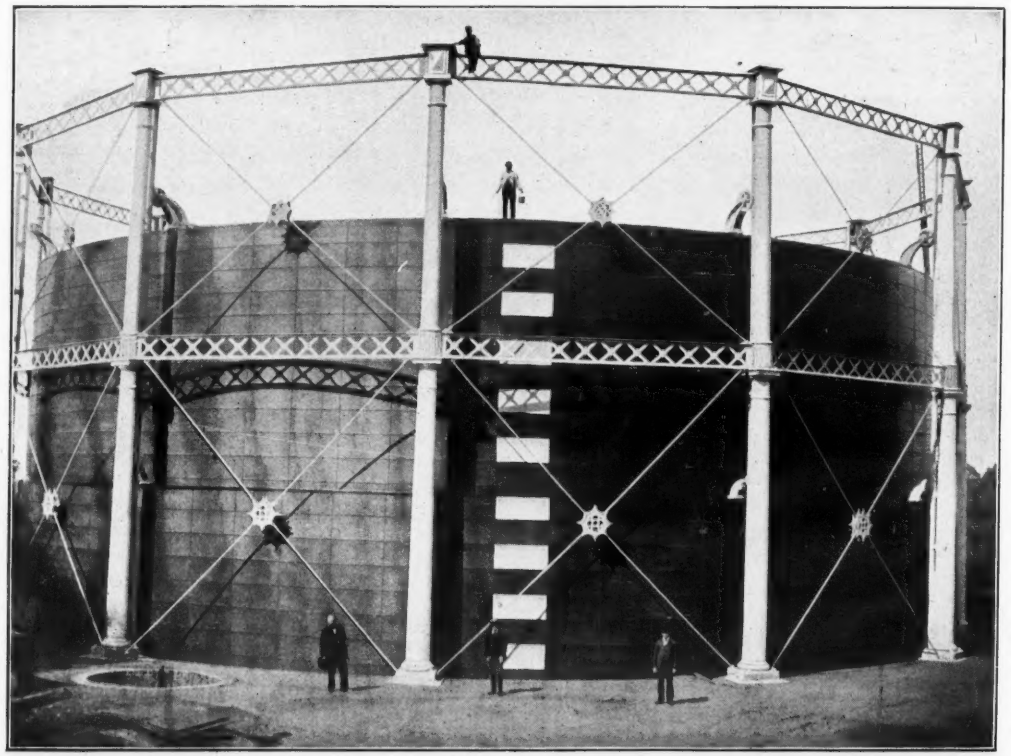
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
NEWTONGRANGE, MIDLOTHIAN.

FOR SALE.

For the

Highest Offer

Received



Before 9 a.m.

on Thursday,

May 26.

TELESCOPIC GASHOLDER, in Excellent State of Preservation.

CAPACITY, 360,000.

Diameter, Outer Lift, 100 Feet. Inner Lift, 98 Feet. Depth of Each Lift, 24 Feet.

Particulars from—**A. E. BROADBERRY, Gas-Works, Tottenham, N.**

Printed and Published by Walter King, at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, May 3, 1910.

TROTTER, HAINES, & CORBETT,
BRETTELL'S ESTATE, LIMITED,
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: E. C. BROWN & CO., LEADENHALL CHAMBERS, 4, ST. MARY AXE, E.C.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.

Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.

Telegrams: "DARWINIAN, MANCHESTER."
Telephone 1806.

HEATHCOTE GAS COAL
from the
GRASSMOOR COLLIERIES,
CHESTERFIELD.

Rich in Illuminating Power and Yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

MIRFIELD GAS COAL.
UNEQUALLED.
Sperm Value 878·85 lbs. per Ton.

Please apply for Price, Analyses, and Report, to the
MIRFIELD COLLIERY COMPANY,
RAVENSTHORPE, NEAR DEWSBURY.
LONDON: 16, Park Village East, N.W.

LUX'S
Gas Purifying Material
Is now used in many Gas-Works throughout Scotland with gratifying success.

FRIEDRICH LUX
Ludwigshafen-am-Rhein

Sole Agent for Scotland:
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1, North Saint Andrew Street, EDINBURGH
Telegrams: "GASLUX, EDINBURGH"

Descriptive Pamphlet on Application.

ARMSTRONG'S PATENT
CANDLE SAFETY LAMPS.

No. 1. No. 2. No. 3.
43, MANCHESTER STREET, GRAY'S INN ROAD, W.C.

THOMAS TURTON
AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.
London Office:
90, CANNON STREET, E.C.

ADDITIONAL REVENUE FOR GAS-WORKS.
COKE SELLING . . AT 11/6 A TON
COALEXLD SELLING AT 20/- A TON
X **IN THE SAME TOWN.**
COALEXLD, LIMITED.
LANCASTER.

IN PAINTING
THE GASHOLDERS AND OTHER OUTSIDE PLANT IT IS FALSE ECONOMY TO USE A CHEAP PAINT WHICH LOSES COLOUR AND DOES NOT PROTECT THE IRON FROM CHEMICAL FUMES.
"SHELL BRAND" (Pure) PAINTS
POSSESS ALL THE PROPERTIES WHICH CHEAP PAINTS LACK.
Prices and particulars on application.
A. H. HAMILTON & CO.,
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"SHELL BRAND" TRADE MARK REGISTERED

S. S. STOTT & CO.,
ENGINEERS,
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LIME & OXIDE ELEVATORS & CONVEYORS.
COAL AND COKE STORAGE PLANTS.
Coal and Coke Elevators and Conveyors.
STAMPED AND RIVETED STEEL ELEVATOR BUCKETS.
DETACHABLE CHAINS AND SPROCKET WHEELS.
HIGH-CLASS STEAM ENGINES. BEAM PUMPING-ENGINES, &c.

Special Pressure and Pressure & Exhaust Registers.
For RETORT-HOUSE GOVERNORS.
For EXHAUSTER HOUSES.
For OFFICES AND DISTRICTS.
Fullest particulars on application to—
T. G. MARSH,
28, Deansgate, MANCHESTER.

GAS COAL AND CANNEL.
WILSON CARTER & PEARSON,
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Gas, Steam, and other Fuel for Home and Export.
GAS COKE CONTRACTORS.
Chief Offices: **50, NEW STREET, BIRMINGHAM.**
Telegraphic Address: "CARTER PEARSON, BIRMINGHAM." Telephone Nos.: CENTRAL 3013 and 3014.

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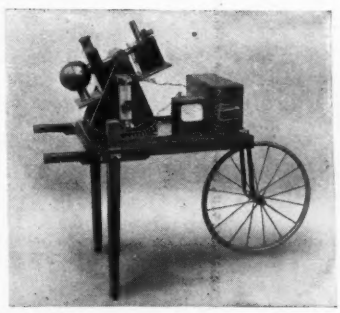

USE THE
SIMMANCE-ABADY
PATENT
PORTABLE PHOTOMETER
Accurate & Simple.
ALEXANDER WRIGHT & CO., Ltd.
WESTMINSTER.

METROPOLITAN GAS METERS, LIMITED,

SOLE MAKERS AND LICENSEES OF THE

"Simplex" AUTOMATIC GAS LIGHTER AND EXTINGUISHER.

Some of its Special Advantages are:

1. It is instantaneous in Lighting and Extinguishing without shock to Mantle, and can be set to its pre-determined times in a few seconds.
2. The Mechanism will act correctly, even though the Lamp-post and Controller be out of the perpendicular.
3. **THE VALVE.**—As this never leaves its seat, and the gas-ways being away from the seating, no impurities can collect between the valve and the seating, and by simply removing a small cap, the gasways can be freed of Naphthalene or any other matter.
4. The leakage of gas into the Clock Mechanism and its resultant troubles are entirely done away with.
5. Vibration of any description will not cause the Mechanism to operate prematurely.
6. The "Simplex" Clock also has the advantage of a Lever Escapement.

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Hyson Green, Nottingham.
Telegraphic Address: "Gasometer Nottingham." Telephone: 204X Nottingham.

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Workmanship and Materials of the Highest Quality.

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Built to any Specification or Gauge.

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ATLAS LOCOMOTIVE WORKS, BRISTOL.

THE WIGAN COAL & IRON CO., LIMTD.,

Are the exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, Wigan, and of the Manton Steam and House Coal Collieries, Worksop, Notts, and supply the well-known Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, House and Steam Coals, &c.

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The Outcome of a Practical Gas Engineer's Life Experience.

THE CENTENARY PETROL GAS TURBINE GENERATOR.

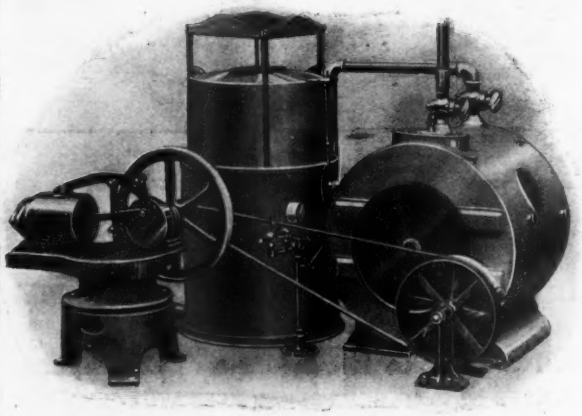
FOR

Lighting, Cooking, Heating

FOR

Villages,
Mansions,
Farm Steadings,
Churches, Schools,
Railway Stations,
County Lighting Districts.

Plants from 100 cub. ft. per hour up to 50,000 cub. ft. per hour for Gas Works.



THE CENTENARY GAS CO. (Dept. M.)
WILLIAM KEY, Engineer.

109, HOPE STREET, GLASGOW. 11, QUEEN VICTORIA STREET, LONDON.

NON-EXPLOSIVE and ECONOMICAL.

GRAETZIN LIGHT

Important Improvements.

BURNERS.

1. **20-Candle Power more light** without increase in the consumption of gas.
2. **Patent Gas Adjuster;** cannot get out of order.
3. **Automatic Gas Regulator,** ensures a constant and unvarying pressure of 35 mm., guarantees a steady light, at the same time obviating waste of gas and blackening of the burner.
4. **Accurate Regulation of the Air Supply.**
5. Burners will be supplied either with Gas Adjuster or Automatic Gas Regulator.
6. The brass casing is heatproof, and, if occasionally cleaned with warm water, will not become discoloured.

LAMPS.

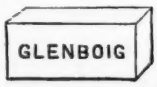
From Lamps with more than one burner, the injectors can be removed from the outside, without taking the lamps to pieces.

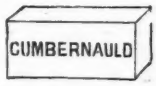
THE GLENBOIG UNION FIRE-CLAY CO., LTD.

GLENBOIG FIRE-BRICKS AND GAS-RETORTS.

Every Genuine Glenboig Brick, Block, Gas-Retort, &c., is legibly stamped with one or other of the Glenboig Company's Registered Trade Marks, as here shown.

TRADE MARKS.





The Glenboig Trade Marks are imitated, and the Glenboig Name unfairly used by Makers of a lower Class of Goods, which, when sold under their own name, command much lower prices.
The Genuine Brand, Stamped on the Goods, is the only Reliable Guarantee to the Purchaser.

GAS-RETORTS, FIRE-BRICKS, BLOCKS, &c., &c.

The SPECIAL BRICKS used in the Construction of Gas Furnaces for Heating Retorts.

Works: GLENBOIG, LANARKSHIRE.
Offices: 48, West Regent St., Glasgow.

56 Prize Medals and Diplomas of Honour.
Highest Award wherever exhibited.

The GLENBOIG BRICKS, BLOCKS, AND RETORTS combine, in the highest degree, the qualities of not melting, and not splitting, when subjected to the highest heats and most sudden changes of temperature, and are, in consequence, found to be economical, even in districts where the local bricks can be had at half the price.

Undernoted we give a Table of Analysis and Physical Characteristics of a sample of Glenboig Fire-Clay by J. T. Norman, London; and, in submitting a report from a responsible and reliable public analyst, we would here draw attention to the unreliable character of some recently published analyses where a manufacturer selects not only his own samples, but also those of his competitor, and has them treated by a private analyst. SUCH STATEMENTS ARE ALTOGETHER UNTRUSTWORTHY.

ANALYSIS OF GLENBOIG FIRE-CLAY.

By JOHN T. NORMAN, Esq., F.C.S., &c., The City Central Laboratory, LONDON.

THE GLENBOIG UNION FIRE-CLAY CO., LTD., GLENBOIG, SCOTLAND.

23, Leadenhall Street,
London, E.C., September 21st, 1909.

Dear Sirs,

I have completed the investigation of the samples of Clay received from you on the 10th inst., and now beg to report the results.

CHEMICAL ANALYSIS.

	Raw.	Fired.
Silica, free	3·03	3·49
Silica, combined	43·20	49·77
Alumina	36·55	42·10
Ferric oxide	1·80	2·08
Titanic oxide	1·30	1·50
Lime	trace	trace
Magnesia	trace	trace
Alkaline oxides	trace	trace
Sulphates as trioxides	0·92	1·06
Loss on Ignition	13·20	—
	100·00	100·00

PHYSICAL RESULTS.

Density	2·65
Volume weight	1·90
Porosity	15·4 %
Linear shrinkage at 100° C.	3·70 %
" " " 1050° C.	4·76 %
" " Total	8·46 %
Volume shrinkage at 100° C.	10·7 %
" " " 1050° C.	12·6 %
" " Total	23·3 %
Plasticity	20·0 %
Fire Stability	1850° C. equiv. to 3362° F.

(SEGER CONE 36.) (New Scale CONE 38.)

(Signed) J. T. NORMAN.

This Clay is remarkable for its high percentage of Alumina and for the almost complete absence of ingredients tending to lower the refractory properties; its fire stability is extremely high. For some years past I have been urging clients who are working the Clays of the Coal Measures to search for such a material, but you are the first to discover a supply. The possession of this Clay places you in a unique position amongst the manufacturers of refractory goods throughout the world, and I have no doubt will, if duly exploited, enable you to drive out of the market the large quantities of foreign fire-bricks which are being poured into this country for use in the construction of bye-product ovens and for other purposes.—I am, yours faithfully,

JOHN T. NORMAN.

Munich Inclined Chamber Furnaces.

Plants already built and under Construction:

Total capacity: 45,000,000 c.ft. of pure Coal Gas per 24 hours.

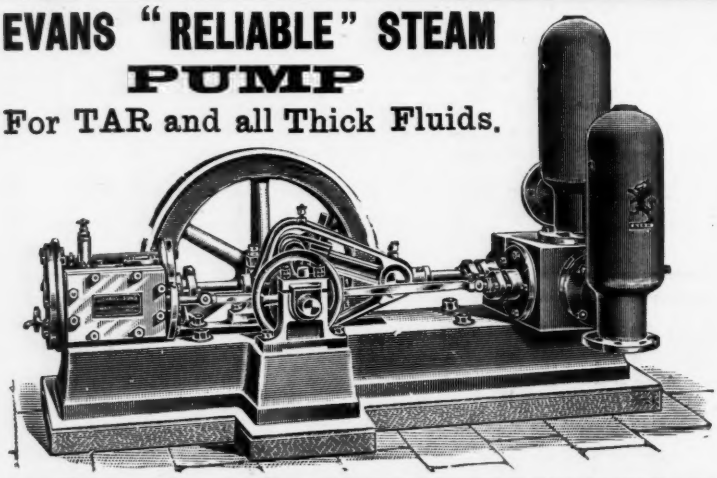
The following Cities have adopted Munich Chamber Furnaces: Berlin, Hamburg (second order), Paris, Munich, Kierstein, Moosach, Leipsig, Rome, Hanau, Regensburg.

For Particulars and Tenders apply to:

The Coke Ovens and By-Products Co., Ltd.,
St. Stephens House, Westminster, S.W.

HARRIS & PEARSON,
STOURBRIDGE, ENGLAND.
MANUFACTURERS OF
FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.
GLAZED BRICKS AND PORCELAIN BATHS.

EVANS "RELIABLE" STEAM PUMP
For TAR and all Thick Fluids.



FIRST AWARDS EVERYWHERE.

Write for No. 8 Catalogue.

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(WOLVERHAMPTON) LTD.,
CULWELL WORKS,
WOLVERHAMPTON.

NEWTON, CHAMBERS, & CO.,
LIMITED.
THORNCLIFFE IRON-WORKS, near SHEFFIELD.
LONDON OFFICE: **Brook House, 10-12, Walbrook, LONDON, E.C.**
Telegraphic Addresses: "NEWTON, SHEFFIELD," "ACCOLADE, LONDON." *National Telephone No. 2200.*

GAS ENGINEERS, IRONFOUNDERS, and CONTRACTORS.

MANUFACTURERS OF EVERY DESCRIPTION OF
PLANT, APPARATUS, AND MACHINERY FOR GAS AND CHEMICAL WORKS.
RETORTS AND FITTINGS, MOUTHPIECES WITH SELF-SEALING LIDS.
IMPROVED COAL AND COKE HANDLING PLANT, CONVEYORS, AND ELEVATORS.
CONDENSERS, SCRUBBERS, AND WASHERS.

PURIFIERS with Planed Joints a Speciality.

PATENT CENTRE-VALVES, RACK AND SCREW VALVES, WOOD GRIDS AND SCRUBBER-BOARDS, CAST-IRON MAINS, AND SPECIALS.
STRUCTURAL WORK, COLUMNS, GIRDERS, AND ROOFING.
GASHOLDERS, CAST-IRON OR STEEL TANKS.

DESIGNS, SPECIFICATIONS, and ESTIMATES FREE.

PIG IRON (special quality) for Engine Cylinders. **GAS COAL** famous for its Unrivalled excellence.

Established 1793.

Welsbach LIGHT

Inverted Arc Lamp, Fig. 623.

Storm Proof—
For Exterior Lighting.

Welsbach-Kern
(Patent) Inverted System

BRITISH MADE.

BRITISH MADE.

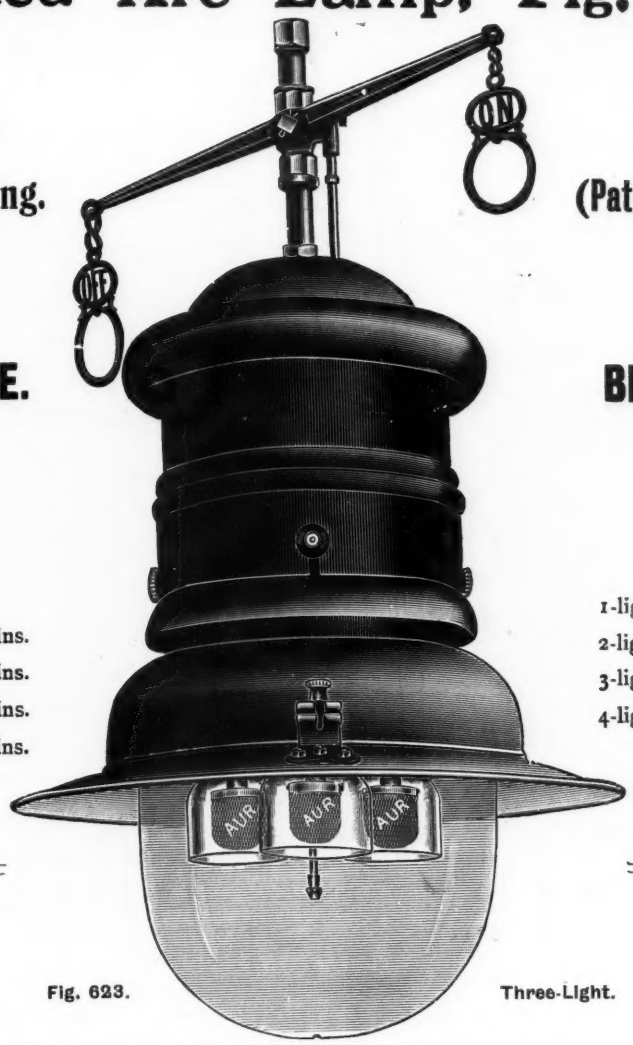

Fig. 623. Three-Light.

Height over all.

1-light . . .	1 ft. 8 ins.
2-light . . .	2 ft. 4 ins.
3-light . . .	2 ft. 4 ins.
4-light . . .	2 ft. 7 ins.

Width over all.

1-light . . .	1 ft. 1 in.
2-light . . .	1 ft. 5 ins.
3-light . . .	1 ft. 5 ins.
4-light . . .	1 ft. 8 ins.

ENAMELLED Green Steel Casing, fitted with Welsbach-Kern Inverted Burners, Gas and Air Regulators operated from outside. Sliding Door to give access to Burners for cleaning purposes. Fitted with Magnesia Nozzles, Welsbach Mantles, and Glass Mantle Protectors. Complete as shown. Highly efficient and regenerative.

	Gas per hour.	*C.P.*	*Steel.*	*Copper Case.*
1-light	4 feet	125	**30/-**	**5/-** extra.
2-light	8 feet	260	**47/6**	**6/-** extra.
3-light	12 feet	400	**52/6**	**6/-** extra.
4-light	16 feet	550	**72/6**	**9/-** extra.

All on or off, or One light on and the rest off, **7/6** per Lamp extra. Cup and Ball, **3/6** per Lamp extra.

RENEWALS.

Glass Mantle Protectors (Fig. 623) **3/4½** per dozen, or in case lots of 5 gross, **33/-** per gross.

	1-Light.	*2-Light.*	*3-Light.*	*4-Light.*
Clear Glass Globes, each	**2/3**	**5/9**	**5/9**	**9/-**
„ „ „ In Case lots per dozen.	**19/6**	**57/9**	**57/9**	**93/-**
Case contains . .	*80*	*18*	*18*	*12*

	1-Light.	*2-Light.*	*3-Light.*	*4-Light.*
Wired Globes, extra each	**2/-**	**2/-**	**2/9**	**3/6**
Parabolic Reflector, extra „	**3/6**	**6/-**	**7/6**	Not made

Welsbach Mantles, each **6d.** subject as usual.

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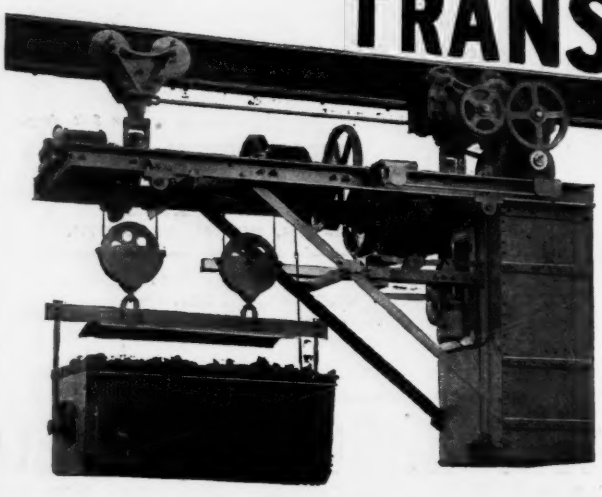

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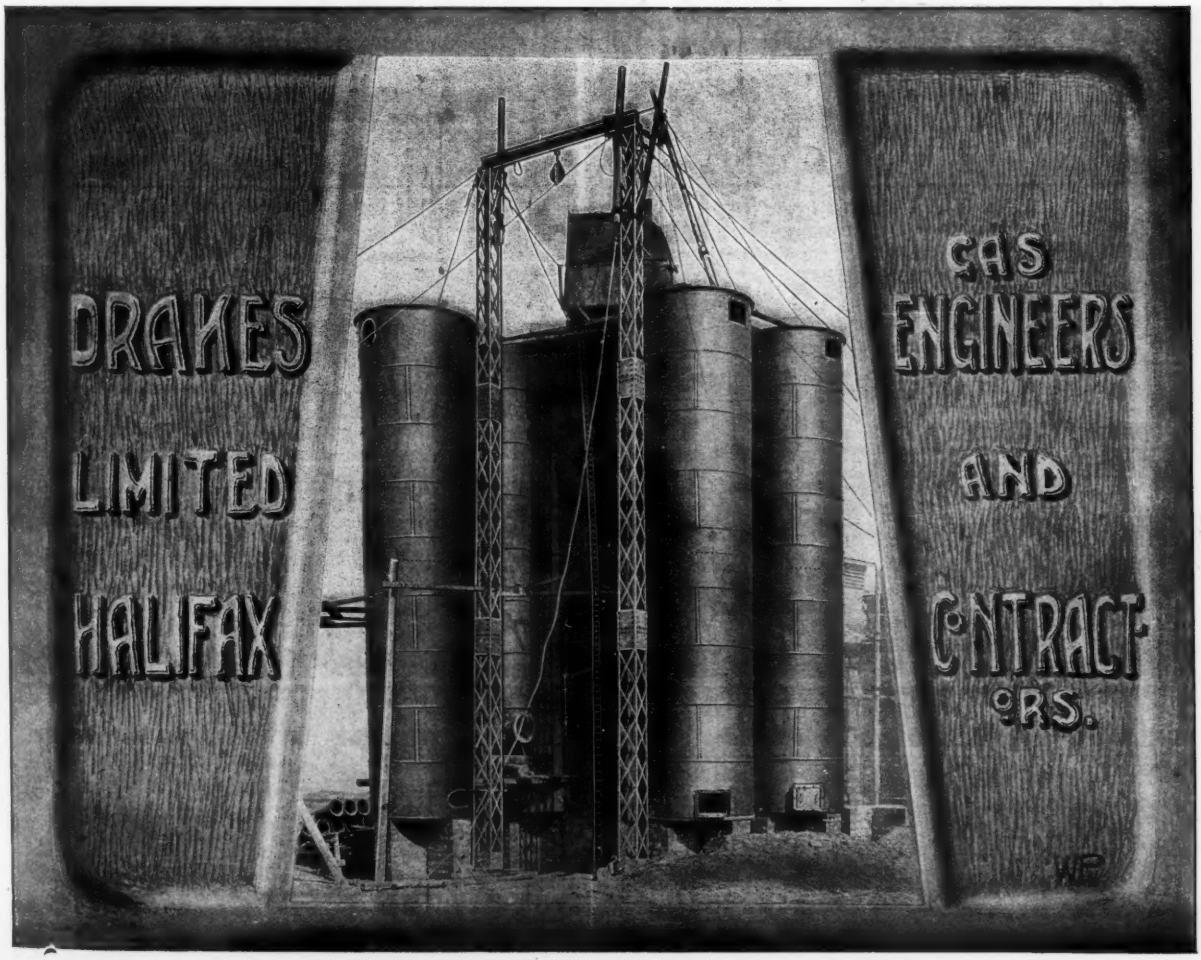

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